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Enviro Control, Inc, Rockville, MD

Prepared for

Fish and Wildlife Service, Fort Collins, CO Western Energy and Land Use Team

May 78

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Biological Services Program

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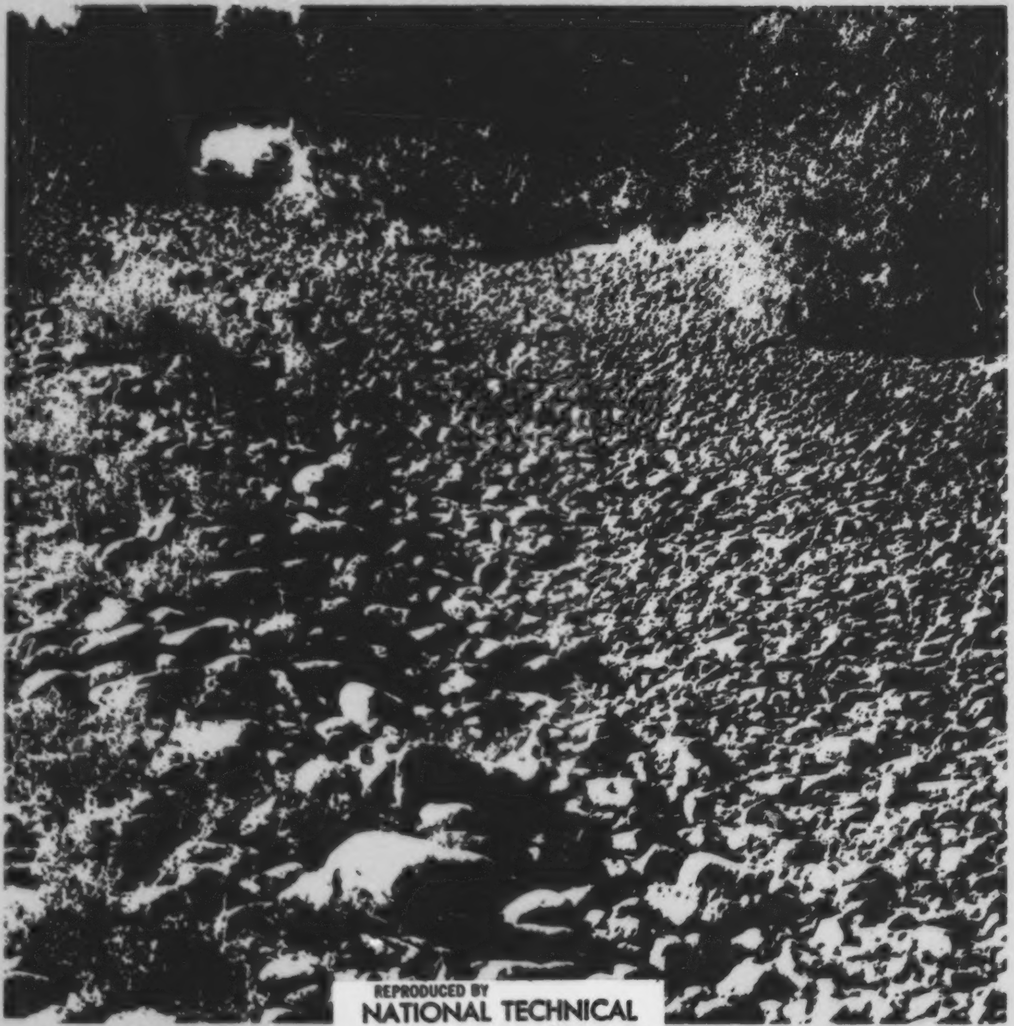
INSTREAM FLOW STRATEGIES FOR WASHINGTON



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The Biological Services Program was established within the U S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues which have an impact fish and wildlife resources and their supporting ecosystems. The mission of the Program is as follows:

1. To strengthen the Fish and Wildlife Service in its role as a primary source of information on natural fish and wildlife resources, particularly with respect to environmental impact assessment.

2. To gather, analyze, and present information that will aid decisionmakers in the identification and resolution of problems associated with major land and water use changes.

3. To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

Information developed by the Biological Services Program is intended for use in the planning and decisionmaking process, to prevent or minimize the impact of development on fish and wildlife. Biological Services research activities and technical assistance services are based on an analysis of the issues, the decisionmakers involved and their information needs, and an evaluation of the state-of-the-art to identify information gaps and determine priorities. This is a strategy to assure that the products produced and disseminated will be timely and useful.

Biological Services projects have been initiated in the following areas:

Coal extraction and conversion

Power plants

Geothermal, mineral, and oil shale development

Water resource analysis, including stream alterations and western water allocation

Coastal ecosystems and Outer Continental Shelf development.

Systems and inventory, including National Wetlands Inventory, habitat classification and analysis, and information transfer

The Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning and management; National Teams which provide the Program's central, scientific and technical expertise, and which arrange for contracting of Biological Services studies with States, universities, consulting firms, and others; Regional staff who provide a link to problems at the operating level; and staff at certain Fish and Wildlife Service research facilities who conduct inhouse research studies.

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This is one of 13 reports that identifies and evaluates the most promising institutional methods for reserving instream flows to benefit fish and wildlife in each of 13 western states. The states included in the study are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. Each report has three main sections. First is a guide to help the reader select the most important strategy for any given situation, followed by a summary evaluation of how well the method has worked in the state. The third part is a detailed narrative description of the procedures for implementing the strategy and an example of how it has been employed in the state.

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Office of Biological Services
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U.S. DEPARTMENT OF THE INTERIOR

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PREFACE

This report represents the combined efforts of several individuals and firms toward a common objective: the identification, description and preliminary evaluation of the most promising strategies (institutional methods) for reserving instream flows for fish and wildlife under existing laws.

Toward this objective, the U.S. Fish and Wildlife Service, through its Western Water Allocation Project, contracted with two firms. Richard Dewsnup and Dallin Jensen received a contract to identify available strategies under state laws, federal laws, interstate compacts, and water quality laws. From a large number of strategies identified by this contract effort, the most promising ones were selected for further evaluation. A second firm, Enviro Control, Inc., was contracted to evaluate the most promising strategies in depth.

The combined efforts of the two firms were published in several reports which are identified below. Following this initial effort, a separate report for each state was published. This was done in the belief that most persons who are involved in instream flow work are primarily oriented to a single state. The several western states are at different levels in terms of their laws supporting instream flows, their water rights traditions, and their past experiences regarding the reservation of instream flows for fish and wildlife. This is one of the individual state reports.

The report is organized into three sections. These are the information matrix, the evalation matrix, and the narrative description of each strategy. The information matrix is intended to be a guide to help the reader select the strategy or stategies most applicable to any particular situation. This matrix contains a general description of the strategy, the most applicable situations for its use, the party or parties who can initiate the strategy, and the party or parties who must implement the strategy.

The evaluation matrix provides a subjective analysis of whether each strategy has been used to advantage, disadvantage, or not at all in each state. A unique feature of the evaluation matrix is that a blank matrix is provided for the reader. This is done because an evaluation of this kind is necessarily a product of a given time frame and a particular point of view. The blank evaluation matrix will allow the reader to evaluate the strategies as times, laws, experiences, and traditions change in the state.

The narrative section of the report contains an expanded description of each strategy, notes its application possibilities, illustrates the usage of the strategy within the state, and evaluates its general utility. All of the narrative materials are oriented to the particular state for which the report is written.

In the use of this report, the reader should be aware of its purposes and limitations. First, only a few of the many possible strategies are described herein. The user should exercise initiative, judgement, and creativity in dealing with any specific situation. Second, this report should be used as a starting point. In any situation related to the acquisition of instream water rights, legal advice should be sought. This report should in no way be construed as a substitute for the opinion of a private attorney, attorney general, or agency solicitor. Third, this report is neither a policy nor decision document. It is simply a collection of strategies which appear to have utility in a variety of situations.

Further questions about these and other strategies may be addressed to the Cooperative Instream Flow Service Group, U.S. Fish and Wildlife Service, Western Energy and Land Use Team, Drake Creekside Building, 2625 Redwing Road, Fort Collins, Colorado 80526. This Group is an interagency, intergovernmental, interdisciplinary service organization under sponsorship of the U.S. Fish and Wildlife Service, Western Energy and Land Use Team. The Group provides a focal point for the increasing activity of instream flow assessments.

For more detail on the strategies, the user of this report should be aware of supportive documentation contained in several related reports:

1. FWS/OBS-77/26. Strategies for Reserving Flows for Fish and Wildlife: Identifcation, Description and Preliminary Evaluation. By Richard L. Dewsnup and Dallin W. Jensen, February 1977. 706 pages.

   This is the full completion report prepared by Dewsnup and Jensen under the FWS contract. It contains chapters on regulatory authority and property rights in water resources, strategies for reserving instream flows under Federal statutes, strategies for protecting instream flows under State statutes, and interstate compacts as they relate to the protection of instream flows. This report is only available from the National Technical Information Service (NTIS Accession No. PB 276 243).

2. FWS/OBS-77/27. State Laws and Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, March 1977. 76 pages.

   This report is a slightly modified version of the State law chapter taken from the above report. It contains a summary matrix in which the legal basis (e.g., statute in the State code) for each strategy in each State will be identified. This report is also available from the National Technical Information Service (NTIS Accession No. PB 272974).

3. FWS/OBS-77/29. Promising Strategies for Reserving Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, Edward Hoban, Gerald Horak, Martin Lewis, and Wayne Nelson, August 1977. 63 pages.

This report contains descriptions of 26 strategies for reserving instream flows under existing laws. The descriptions provide guidance on the level of action required, legal bases for each strategy, and advantages, disadvantages, and costs involved in strategy implementation. This report is also available from the National Technical Information Service (NTIS Accession No. PB 276 046).

LIST OF ABBREVIATIONS

BLM	Bureau of Land Management
BR	Bureau of Reclamation
CE	Corps of Engineers
DOE	Department of Energy
FERC	Federal Energy Regulatory Commission
FWS	Fish and Wildlife Service
FS	Forest Service
HCRS	Heritage Conservation and Recreation Service
SCS	Soil Conservation Service

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INFORMATION MATRIX

INFORMATION MATRIX

Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
APPROPRIATIVE WATER RIGHTS							
State Condemnation and Reallocation of Water Rights	Condemning a water right to preserve instream flows	Along overappropriated streams	Washington Department of Ecology; Washington Departments of Fisheries and Game; public interest groups	Identify streams where the condemnation of a water right can make a significant difference to the fishery; file a condemnation proceeding in the appropriate Superior Court	Superior Court Judge	Condemn water right	Water right cost; judicial cost
State Appropriation of Instream Flow	Obtaining an administrative appropriation of streamflow from the State water rights agency for fish and wildlife purposes	Primarily along streams not fully appropriated; secondarily along overappropriated streams	Washington Department of Ecology; Washington Departments of Fisheries and Game; public interest groups;	Identify sites in a river basin best suited for flow management	Washington Department of Ecology; Washington Departments of Fisheries and Game; public interest groups	Conduct study; define and set base flow	Study cost; administrative cost
State Moratoria on New Appropriations	Obtaining a moratorium on granting of further appropriations from the permit authority for the consideration of fish and wildlife needs.	In a rapidly developing river basin	Washington Departments of Fisheries and Game; another State or local government agency; private individual; public interest group	Identify river where development is rapidly occurring; petition Washington Department of Ecology to declare a moratorium	Washington Department of Ecology; Washington Departments of Fisheries and Game	Grant moratorium; study the river basin and make flow recommendations to be incorporated in basin plans	Bargaining cost; administrative cost; study cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State Discretionary Water Permit Authority	Utilizing discretionary opportunities by the permit authority for the benefit of instream flows	Granting new water premits or exchanges or transfers of existing rights	Washington Departments of Fisheries and Game; public interest groups	Petition the Department of Ecology to deny or amend permit application	Department of Ecology	Deny or amend permit application	Bargaining cost; study cost
LEGISLATIVE AND ADMINISTRATIVE CONTROLS							
Federal Reauthorization of Projects	Reauthorizing existing Federal water resource projects to provide for instream flow reservations	At existing Federal dams or stream diversions	Construction agency; public interest groups; FWS Area Office (Olympia); Washington Departments of Fisheries and Game	Lobby to have construction agency conduct feasibility study; seek Congressional reauthorization	U.S. Congress	Enact legislation reauthorizing the project (approved by Committee, passed by both houses)	Feasibility study cost; bargaining cost; legislative cost
State-Federal Wild and Scenic Rivers System	Designating stream segments for inclusion within a wild and scenic rivers system to promote instream flow reservations	Along free-flowing stream, segments, bordered by visually appealing landscape	Local citizens; Member of Congress	Organize and demonstrate local support to convince elected representatives to introduce a Bill	U.S. Congress; Forest Service; Heritage Conservation and Recreation Service; FWS Regional Office; Washington Departments of Fisheries and Game	Pass a Bill authorizing study of the segment(s); conduct study to inventory resource and solicit local views' after agency review, consider study report in Congressional Committee and pass a Bill approving designation	Study cost; legislative cost

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Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State Definition of Navigable Waters	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
State-Federal Interagency Consultation	Adopting interagency agreements, regulations, and formal procedures to implement the Fish and Wildlife Coordination Act toward promoting instream flow reservations	Planning new or expanded Federal water resource projects	FWS Region 1 Office; Washington Departments of Fisheries and Game; public interest groups	Seek interagency agreements based on adopted regulations or procedures; promote strengthening procedures or see that they are enforced	FWS Region 1 Office; Washington Departments of Fisheries and Game; construction or permit agency	Draw up agreements or make existing procedures more stringent	Bargaining cost
Federal License and Permit Stipulations	Incorporating stipulations in new and renewed Federal licenses and permits to reserve instream flows	Authorizing planned or existing Federal dams and reservoir projects	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups; private citizens	Determine quantity of flow required; make specific instream flow recommendation to permit or license agency	Permit or license agency (FERC, BLM, FS etc.)	Stipulate flow reservation in permit or license	Study cost; bargaining cost
State Allocation of Reservoir Space	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State Purchase and Lease of Water Rights	Obtaining contractual arrangements which include direct purchase of flow rights, the leasing of water rights, and the purchase of shares in a mutual water company to enhance instream flows	Particularly along overappropriated streams	Washington Departments of Fisheries and Game; private citizens; public interest groups	Identify stream where the purchase of only a few cfs can make a significant difference to the fishery; locate willing seller, lessor, or mutual shares company	Washington Departments of Fisheries and Game; private citizens; public interest groups	Purchase or lease water right or purchase shares in a mutual shares company	Acquisition cost; negotiation cost
WATER RESOURCE PLANNING							
Federal Water Resources Council Planning Program	Considering instream flow needs in Water Resources Council planning programs toward promoting flow reservations	Planning river basin and energy development	Washington Departments of Fisheries and Game; Washington Department of Ecology; Cooperative Instream Flow Group; FWS Region 1 Office; public interest groups	Lobby to have instream flows considered in Level B study or section 13(a) assessment	Pacific Northwest River Basins Commission	Include instream flow requirements in Level B study or section 13(a) assessment	Study cost
Federal Aid Funding to Purchase Storage	Expending Federal Aid funding to purchase reservoir storage as a means of reserving instream flows	Along overappropriated streams at privately owned reservoirs	Washington Departments of Fisheries and Game	Identify stream and reservoir; file required documents requesting funds from Region 1 Federal Aid Office	FWS Region 1 Federal Aid Office; Washington Departments of Fisheries and Game	Grant funds; purchase the water rights	Administrative cost; acquisition cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
Federal Reservoir Construction and Enlargement	Constructing larger new reservoirs or enlarging existing reservoirs to provide for instream flow reservations	At existing or planned Federal reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Conduct stream investigation; recommend a larger dam and reservoir; allocate additional costs to fish and wildlife benefits	Construction agency; U.S. Congress	After possible Congressional authorization, constructs additional storage for instream flows	Study costs; bargaining cost; construction cost; legislative cost
WATER RESOURCE MANAGEMENT							
State Water Rights Records Analyzed	Analyzing water rights records as an aid to reserving flows	Bargaining for an instream flow	Washington Departments of Fisheries and Game; FWS Area Office (Olympia); public interest groups	Determine the extent, location and ownership of water rights from the Washington Department of Ecology	Washington Departments of Fisheries and Game; FWS Area Office (Olympia); public interest groups	Select the best couse of action to reserve an instream flow	Water data cost; study cost
State-Federal Flow Requests Made Early	Presenting recommendations early in the decision process to achieve reservation of instream flows	At planned Federal dams and reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Conduct a timely investigation; recommend an instream flow to the construction agency	Construction agency	Include instream flow in project plans	Study cost; gaging, installation and maintenance cost; bargaining cost

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Strategies for Reserving Instream Flows in Washington

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State-Federal Flow Requests Made Specific	Specifying and monitoring instream flow reservations to protect downstream fish and wildlife resources	Along stream reaches below existing or planned Federal dams and reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Conduct detailed instream flow study; recommend flow to the construction and/or permit agency, specifying flow releases and flow quantities required at downstream sites	Construction agency/permit agency	Include flow releases in reservoir's operating criteria; install gaging stations to determine the sufficiency of the actual releases	Study cost; gaging installation and maintenance cost; bargaining cost
State-Federal Combined Storage and Flow Requests	Negotiating for reservoir storage to facilitate instream flow reservations	Planning new reservoirs or reallocating storage space in existing Federal reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Request information regarding reservoir storage allocations and projected sales form the construction agency; determine the amount of storage available to ensure minimum instream flows; recommend storage and flow requirements	Construction agency	Allocate storage to fish and wildlife; include flow releases in the reservoir operating criteria	Bargaining cost; study cost

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Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
ENGINEERING ALTERNATIVES							
Coordinated Multi-Reservoir Operations	Coordinating operations of multi-reservoir systems to facilitate instream flow reservations	At Federal dams and reservoirs in multi-reservoir system	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; FWS Region 1 Office	Conduct system-wide flow study to establish the flows required; propose to alter the operations manual and memorandum of agreement to ensure the recommended flows	Agency or agencies operating the system; U.S. Congress	After possible Congressional reauthorization or relicensing, revise the system operations manual to include stream flows	Study cost; bargaining cost; legislative cost
Reservoir Sediment Storage Releases	Releasing reservoir sediment storage reserves to promote instream flow reservations	At existing Federal dams and reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Determine the quantity of available yield from the sediment reserve; recommend that the construction or administering agency reassign a portion of this yield to benefit fish and wildlife resources	Construction or administering agency	Modify project operation; release yield from the sediment reserve for instream flows	Study cost; bargaining cost

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Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
Stream Channels to Convey Stored Water	Conveying stored water to downstream users via the stream channel to aid in securing instream flow reservations	At planned Federal dams and reservoirs	FWS Area Office (Olympia); Washington Departments of Fisheries and Game; public interest groups	Obtain information regarding proposed conveyance systems; determine system's effect on fish and wildlife resources; recommend system modification to the construction agency	Construction agency	Modify conveyance system to preserve fish and wildlife resources	Study cost; re-design cost; bargaining cost

EVALUATION MATRIX

EVALUATION MATRIX Strategies for Reserving Instream Flows in Washington

yes = Advantage ●
no = Disadvantage ○
blank - inapplicable (in this State)

	ELEMENTS OF EFFECTIVENESS																				ELEMENTS OF COST					
	Overall		Political			Legal					Administrative						Resource					Institutional			Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?
Appropriative Water Rights																											
State Condemnation/Reallocation of Water Rights	○	○	●	○	●	●	○	●	●	●	●	○	●	●	●	○	●	○	○	●	●	○	○	●	●	●	○
State Appropriation of Instream Flow	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●
State Moratoria on New Appropriations	●	●	○	○	●	○	○	●	○	○	○	●	●	●	●	●	○	○	○	○	●	●	○	○	●	●	○
State Discretionary Water Permit Authority	●	●	●	○	●	○	●	●	●	○	●	●	●	●	●	○	○	○	○	○	●	●	○	●	●	●	○
Legislative/Administrative Controls																											
Federal Reauthorization of Projects	○	●	●	○	●	●	○	●	●	●	●	○	○	●	●	○	●	●	●	●	○	○	○	○	●	●	○
State-Federal Wild & Scenic River Systems	●	●	○	○	●	●	○	●	●	●	●	●	●	●	○	○	●	○	●	○	●	○	○	○	●	●	●
State Definition of Navigable Waters																											
State-Federal Interagency Consultation	○	●	●	●	●	●	●	●	●	○	○	●	●	●	○	●	○	○	○	○	○	●	○	●	●	●	●
Federal License & Permit Stipulations	●	●	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	○
State Allocation of Reservoir Space																											
State Purchase & Lease of Water Rights	○	○	●	●	●	●	●	○	○	●	●	○	●	●	●	○	●	●	●	●	●	●	●	●	●	○	●
Water Resource Planning																											
Federal WRC Planning Programs	●	●	○	○	○	●	●	●	○	○	●	●	●	●	●	●	○	○	○	○	○	●	○	○	●	●	●
Federal Aid Funding to Purchase Storage	○	○	●	●	○	●	●	○	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	○	●
Federal Reservoir Construction/Enlargement	●	○	●	○	●	●	○	●	○	○	●	●	●	○	●	●	●	●	●	●	○	●	○	○	○	●	●
Water Resource Management																											
State Water Rights Records Analyzed	●	●	●	●	○	●	●	●	○	○	○	○	○	○	●	●	○	○	○	●	●	●	●	●	●	●	●
State-Federal Flow Requests Made Early	●	●	●	○	○	●	●	●	○	○	●	●	●	●	●	●	●	○	●	●	○	●	○	○	●	●	●
State-Federal Flow Requests Made Specific	●	●	●	○	○	●	●	●	○	○	●	●	●	●	●	●	●	○	●	●	●	●	○	○	●	●	●
State-Federal Combined Storage/Flow Requests	●	●	●	○	○	●	●	●	○	○	●	●	●	○	●	●	●	●	●	●	○	●	○	○	●	●	○
Engineering Alternatives																											
Coordinated Multireservoir Operations	●	●	●	○	●	○	●	●	○	○	●	○	○	○	●	○	●	○	●	●	○	●	○	○	●	●	○
Reservoir Sediment Storage Releases	○	●	●	○	●	○	○	●	○	○	●	○	○	○	●	○	○	●	●	●	○	●	○	●	●	●	○
Stream Channels to Convey Stored Water	○	●	●	○	○	○	●	●	○	○	○	○	○	○	●	●	●	○	●	●	●	●	○	○	●	●	●

Answers are strictly judgmental, based on written and verbal opinion reported to the Enviro Control study team through December 1977; subject to modification by selected reviewers (empty matrix furnished for reviewers on the following page).

EVALUATION MATRIX Strategies for Reserving Instream Flows in ____________

yes = Advantage ●
no = Disadvantage ○
blank - Inapplicable (in this State) ☐

	ELEMENTS OF EFFECTIVENESS																					ELEMENTS OF COST					
	Overall		Political			Legal					Administrative						Resource					Institutional			Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?
Appropriative Water Rights																											
State Condemnation/Reallocation of Water Rights																											
State Appropriation of Instream Flow																											
State Moratoria on New Appropriations																											
State Discretionary Water Permit Authority																											
Legislative/Administrative Controls																											
Federal Reauthorization of Projects																											
State-Federal Wild & Scenic River Systems																											
State Definition of Navigable Waters																											
State-Federal Interagency Consultation																											
Federal License & Permit Stipulations																											
State Allocation of Reservoir Space																											
State Purchase & Lease of Water Rights																											
Water Resource Planning																											
Federal WRC Planning Programs																											
Federal Aid Funding to Purchase Storage																											
Federal Reservoir Construction/Enlargement																											
Water Resource Management																											
State Water Rights Records Analyzed																											
State-Federal Flow Requests Made Early																											
State-Federal Flow Requests Made Specific																											
State-Federal Combined Storage/Flow Requests																											
Engineering Alternatives																											
Coordinated Multireservoir Operations																											
Reservoir Sediment Storage Releases																											
Stream Channels to Convey Stored Water																											

APPROPRIATIVE WATER RIGHTS

STATE CONDEMNATION AND REALLOCATION OF WATER RIGHTS

I. Identification

The power to condemn existing water rights extends in Washington beyond the power to condemn for public water supply. Any person may condemn an inferior use of water for a superior use (Rev. Code. Wash. § 90.03.040). However, the statute does not designate priorities among uses; this is left to the court. This statutory right to condemn is limited in that a right cannot be condemned for irrigation purposes when the owner of the right will be deprived of the right to the quantity of water reasonably necessary to irrigate the land he has already put into production. The Department of Fisheries is specifically authorized to acquire water rights by condemnation to protect the Columbia River Fish Sanctuary (Rev. Code. Wash. § 75.20.020).

Water rights abandoned or forfeited by nonuse (also see strategies entitled State Discretionary Water Permit Authority and State Water Rights Records Analyzed) are considered relinguished under Rev. Code. Wash. § § 90.14.130 to 90.14.210 and may be reallocated to another beneficial use through the State permit system or through other administrative mechanisms such as the Basin Management Plan. Water thus relinguished could be allocated to base flows or minimum flows under the appropriate statute.

The chief legal basis of condemnation is the condemnation statute; where forfeiture of a right for nonuse is concerned, the legal basis is the relinguishment Statute.

II. Application

Under the condemnation Statute any person can condemn a water right being used for an inferior purpose in order to use the water for a superior use. Parties applying this strategy might include the State Department of Game, the State Department of Fisheries, and the State Department of Ecology. The process would involve filing a condemnation proceeding in the appropriate Superior Court and convincing the Superior Court Judge to, in effect, judicially force a sale of the condemned right.

By the Water Resources Act of 1971, (Rev. Code. Wash. § 90.54.020) the State legislature has placed a high priority on fish and wildlife as a beneficial use, so the person or agency bringing the action should be able to use the condemnation procedure. However, since no statute ranks the various uses in order of priority, the question of "highest use" is one for the discretion of the court. Therefore, the party bringing the action would have to convince the Superior Court Judge that the relative benefits of use of the water for fish and wildlife outweigh those of the current use.

The parties involved in a relinguishment of water rights under R.C.W. 90.14 procedures, which formally record relinguishments so that water rights can become available for reallocation,would be the Department of Ecology and the party who has obtained but who, without cause, does not use the rights. Other parties might be involved in an advisory capacity; for example, the Department of Game, the Department of Fisheries, an environmental group, or an individual, becoming aware of a potential relinguishment or a case of nonuse, might refer it to the Department of Ecology for action. Essential to the use of this strategy is knowledge of water rights records (See Strategy entitled State Water Rights Records Analyzed) and the ability to field check water use. Both of these actions together with the required legal expertise would incur considerable cost.

III. Illustration

Though there is legal precedent in the State of Washington for using the power of eminent domain to condemn the irrigation rights of a local Water District for a community water supply, a precedent which resulted in the purchase of both land and water rights through the condemnation procedure, this strategy has not been used by Washington State resource agencies as a method of reserving instream flows.

IV. Evaluation

Until recently, the Washington State Department of Ecology has not pursued relinguishment of water rights under Rev. Code. Wash. § 90.14. The Department recently decided to pursue some test cases of involuntary relinguishment; however, the only rights relinguished so far have been voluntarily submitted. According to sources in the State Department of Game, the State Department of Ecology, and the State Attorney General's office, the reasons that other strategies for reserving instream flows are preferred over condemnation are, first, that condemnation is an inefficient method, and second, that it is a costly one.

The chief obstacle to a successful condemnation proceeding is the problem of proving that a fish and wildlife use is a higher use than the use to which the water is being put, as, for example, irrigation. If the existing beneficial use is one which carries with it an obvious and easily measured economic value, proof that such use is outweighed by the less tangible ecological, scenic, and recreational values associated with fish and wildlife may be impossible to gather. Add to this an inclination on the part of a local Superior Court Judge toward agriculture, and chances of a favorable judgement are almost nil.

Moreover, this method results in a piecemeal approach to the problem of reserving instream flows. It requires litigating on a case-by-case, right-by-right basis, a costly and time-consuming process. Costs incurred for legal fees would be large; costs for instituting and implementing the kind of studies necessary to prove superior economic benefit would probably be even larger. The State Department of Game's experience with the difficulty of developing an appropriate methodology for the setting of minimum flows under the Minimum Water Flows and Levels Act (RCW § 90.22) has convinced Department officials that the expense and effort involved in using the condemnation strategy would not be justified.

Though the prevailing attitude towards condemnation among water and game resource personnel is negative, the strategy might have some usefulness in the future. Few states have as favorable a legal basis for it as Washington. Department of Ecology sources are somewhat more favorably disposed towards the forfeiture/relinguishment process as a means of recovering water rights into the public domain for reallocation for other purposes, among them fish and wildlife.

The Department of Ecology believes that as more and more streams approach full appropriation and as population increases or shifts, the relinguishment of unused water rights will become more and more important. Furthermore, the Department believes that many issued water rights exceed actual present use and that a significant reduction of this difference is essential to effective water management under its Basin management programs.

The chief impediment to successful application of this procedure seems to be lack of personnel to check records and to patrol streams to ascertain whether rights are being used. The Department of Ecology has recently recommended to the State legislature ways to implement the relinguishment Statute and has begun to take action on a few test cases to test whether existing legislation is strong enough to accomplish involuntary relinguishment.

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STATE APPROPRIATION OF INSTREAM FLOW

I. Identification

Washington has two statutes which provide mechanisms for reserving instream flows. The Minimum Water Flows and Levels Act (Rev. Code Wash. § 90.22) of 1967, revised in 1969, provides a formal process by which the Washington State Department of Ecology may set, by administrative regulation, both "minimum stream flows" and "minimum lake levels" to protect fish and wildlife resources and recreational aesthetic values. This Act sets forth hearing procedures for establishing minimum stream flows, but it does not define criteria for determining them. The Water Resources Act of 1971 (Rev. Code Wash. § 90.54) further provides that "base flows" necessary to maintain navigation and to preserve wildlife, fish, scenic, aesthetic, and other environmental values shall be maintained on all perennial streams and rivers, and that lakes and ponds shall be maintained substantially in their natural condition. This Act declares "fish and wildlife maintenance and enhancement" to be a beneficial use. Under this act, base flows are set by administrative regulation as a part of a Basin Management Program. The Department of Ecology also has authority to close a stream to further appropriation as part of a Basin Management Program (see strategy entitled State Moratoria on New Appropriations).

The effectiveness of both minimum flows set under Rev. Code Wash. § 90.22 and base flows set under Rev. Code Wash. § 90.54 is enhanced by an earlier statute, Rev. Code Wash. § 75.20.050, passed in 1949, which authorizes the water rights administrator, upon the advice of the Directors of the Departments of Game and Fisheries (two separate departments in Washington) to refuse to issue a permit which might result in lowering the flow of water below that necessary to adequately support fish populations (see strategy entitled State Discretionary Water Permit Authority). This statute also authorizes administrative action to close streams to further appropriation (see strategy entitled State Moratoria on New Appropriations).

II. Application

The primary parties involved in formulating and applying this strategy are the Washington State Departments of Game and Fisheries and the Department of Ecology. Citizen committees are also part of the process. Action under the Minimum Water Flows and Levels Act (Rev. Code Wash. § 90.22) results only after hearings have been held and input has been gathered from resource specialists in order to identify instream flow requirements for the stream in question. Formulating these requirements depends on the development of a methodology for measuring instream flow needs. According to the Department of Ecology's 1977 Recommendations to the Washington State Legislature, no single, definitive methodology has been developed; despite a number of investigations, a lack of basic data, together with the complexity of the subject, has led to a virtual abandonment of this procedure for the establishment of minimum flows. Indeed, since the Act's passage in 1967, only one minimum flow regulation, that adopted for the Cedar River in 1971 (Washington Administrative Code 173-30), has been established.

Action under the Water Resources Act of 1971 (Rev. Code Wash. § 90.54) involves the Department of Ecology, charged with the task of formulating a comprehensive water plan; the public, through public meetings and citizens' advisory committees; and interested resource agencies such as the Departments of Game and Fisheries, which participate in the stream classification process. Instream flow reservation under the Water Resources Act of 1971 (Rev. Code Wash. § 90.54) requires establishing what is called a "base flow." Unlike the difficult-to-achieve "minimum flow" required under Rev. Code Wash. § 90.22, the base flow is a ball park figure arrived at by combining data on historical flows in a given stream reach with estimates of the environmental value of that stream. Nevertheless, as is outlined by a Technical Bulletin of the Department of Ecology, reaching a base flow requires a number of steps, some of them highly technical.

First, in a process called "Stream System Analysis" the river basin is examined to identify the sites best suited for flow management. Existing or former continuous record stream gaging stations are used wherever possible. According to the Department of Ecology, there is some capability to add gages through a cooperative program with the United States Geological Survey (USGS). Some USGS gages are now being removed because they are no longer needed to gather historical data; however, the Department of Ecology is trying to convince the USGS to leave them, since current data is still needed. The Department contributes 50% of the funding for a substantial number of gages and 25% of the funding for others. If the USGS does remove gages, the Department of Ecology substitutes staff gages to give some means of measurement. The Department prefers to select flow control sites near the mouth of the mainstem stream and the mouths of major tributaries.

Once control sites are located and mapped, the next step is stream classification. This procedure identifies differing levels of base flow needed to preserve environmental values within a stream system. A stream classification committee consisting of representatives of each of the seven State resource agencies which has an interest in establishing a base flow arrives at a numerical rating which combines the relative values for that stream of each of the environmental factors listed in the statute. It is at this stage that the Departments of Game and Fisheries have the best chance to influence the instream flow reservation, since their individual rating of the resource value of a stream forms part of the over-all rating later used to calculate the base flow.

A third step involves defining the base-flow level for each stream by analyzing historical streamflow records for that stream and graphing the relative year-round expectancy of different levels of streamflow. This process results in a series of base-flow hydrographs which show expected flows for both high-flow and low-flow periods. This information together with the stream-classification numerical value produces the base flow: the required quantities of water in cubic feet per second for the first and the fifteenth of each month for each stream in the system.

The base flows are enforced by administrative rules issued by the Department of Ecology as part of the Basin Management Program; basin regulations are tailored to accommodate specific problems. These regulations establish base flows, confirm historical stream closures and define new closures, establish appropriation limits and define management procedures and relationships.

Water management in a basin operating under a Basin Management Program must take into account base-flow regulations, prior water rights, and low-flow restrictions which may have been placed on prior water rights, as well as the locations of control stations. For water rights established after the effective date of a base-flow regulation, where management units have downstream control sites, whenever the streamflow recedes to below the established base-flow level upstream diversions are stopped in inverse order of priority until there is sufficient flow at the control station to meet or exceed the required base flow. Where the management units have upstream control stations, in order to assure base-flow levels below the station, a specific downstream water diversion must be stopped when the flow at the station falls below the total of base flow, plus downstream water rights having priority over the diversion in question, plus the amount of the diversion in question. For water rights established before the effective date of a base-flow regulation, but subject to low-flow restrictions under the Washington Permit and Certificate System (see strategy entitled State Discretionary Water Permit Authority), management depends on whether the low-flow restriction exceeds or is equal to or less than the base-flow requirement. If a permit restriction equals or is less than the base flow, diversion is controlled in priority sequence according to the individual conditions of the low-flow proviso. Where a low-flow restriction exceeds the base-flow requirement, no action is taken to curtail the right until all diversions under rights subject to base flows have been curtailed. Water rights established before the effective date of a base-flow regulation and not subject to low-flow restrictions are regulated in priority sequence only when there is insufficient water to accommodate all rights in this category and only after all diversions subject to flow restrictions have been curtailed.

Base-flow regulations under the Basin Management Program (Rev. Code Wash. § 90.54) may be superseded by regulations promulgated under the Minimum Water Flows and Levels Act of 1969 (Rev. Code Wash. § 90.22). In case such regulations are promulgated, a fourth management phase is superimposed on the foregoing. Rights coming into being after the minimum flow restriction was established would be subject to the minimum flow. Rights coming into being prior to the minimum flow restriction put after the Basin Management Plan regulations were promulgated would be subject to the base-flow priority.

III. Illustration

The Okanogan River Basin in North Central Washington is the lower portion of a larger basin, most of which lies north of the Canadian border. From its headwaters in Canada, the Okanogan River flows south to Lake Osoyoos on the U.S.-Canadian border and continues south to the Columbia River; its major U.S. tributary is the Similkameen, which has headwaters in both the U.S. and Canada. About 95% of of the average annual flow of 2.2 million acre feet available in the U.S. portion flows into the U.S. through Canada. The Colville Indian Reservation occupies the southeastern corner of the basin. Thus water management problems have both international and Indian water rights ramifications.

The basin is economically dependent on agriculture; however, there is some tourism and the possibility of future mining development. According to the Department of Ecology's 1977 recommendations to the legislature:

> The Okanogan River Basin Water Resources Management Program and the accompanying management regulation (Chapter 173-549 WAC) were adopted on August 14, 1976. The program (a) protects existing rights, (b) sets forth "base flows" necessary for preserving instream values, (c) establishes beneficial use preferences, (d) "closes" certain streams and natural lakes in the basin to further consumptive appropriation (with certain exceptions for domestic and stock watering uses), (e) establishes quantities of public water by stream management unit available for future appropriation, subject to the beneficial use priorities, and (f) sets forth water resource administrative procedures.

In formulating its management and use plan for the waters of this basin under the Water Resources Act of 1971 (Rev. Code Wash. § 90.54) over a period of three years (1973-1976) the Department of Ecology worked with residents of the basin. Policies were developed with the help of a standing citizens' advisory committee, public meetings, and citizen questionnaires. These joint efforts produced the following preferences of beneficial use:

Priority I	Existing Rights
Priority II	Domestic Use
Priority III	Base Flows
Priority IV	Irrigation, Agricultural Industry Uses
Priority V	Other Consumptive and Nonconsumptive Uses

Existing appropriative and other rights are not affected by the management progam. Use priority of existing rights depends on date of filing of permit application or of adjudicative decree. Indian rights are included in existing rights but are not quantified by the plan. Domestic use includes lawn and garden up to ½ acre and livestock use excluding feedlot operation. Water rights for domestic use are not subject to base flow. Base flows have priority over additional irrigation, agricultural uses and all other additional consumptive uses. By applying its mechanism for arriving at base flows, the Department of Ecology arrived at the following base flows from April to October for the lower Okanogan River at Malott:

	1st	15th
April	1120	1250
May	1400	4000
June	4000	4000
July	2400	1400
August	1050	800
September	800	800
October	940	1100

The Departments of Game and Fisheries participated in the analysis which included conducting field studies of the river. The field studies required approximately one-person month of effort.

Future allocations in the Okanogan River Basin have been prescribed by use priority. However, to date the effectiveness of the allocations and the base flows have not been tested because no new appropriations were allowed in 1977 due to the severe drought.

IV. Evaluation

Regarding the procedure under the Minimum Water Flows and Levels Act (RCW § 90.22) sources in the Department of Game and the Department of Ecology are emphatic in stating that the procedure does not work, since it is too time-consuming and cumbersome. The fact that only one minimum flow regulation has been adopted (that for Cedar River in 1971, Washington Administrative Code 173-30) since 1967 would seem to bear out this evaluation. However, sources in the Attorney General's office feel that the Department of Ecology has never really tried to develop regulations under § 90.22 and that the regulations under § 90.54 confuse the issue.

Regarding the application of procedures developed under the Water Resources Act of 1971 (RCW § 90.54) both the Game and Fisheries Departments and the Department of Ecology are enthusiastic. In fact, one Department of Game official called it the only way to designate instream flows that works in Washington.

However, this approval of the procedure is tempered with one proviso. Department of Game sources do not believe the base flow enforcement procedures will work unless the mechanisms for placing a ceiling on further appropriations on highly appropriated streams are implemented (see strategy entitled State Moratoria on New Appropriations). If permits are issued on such streams, even permits containing conditions and restrictions, there is a danger that permit holders will eventually have enough political clout to take their claims to water into a local court of equity and challenge the enforcement of the base flow program.

As of March 1978, base flow analyses had been undertaken in 23 of the 62 Water Resource Inventory Areas in the state; analyses have been completed for 12 WRIAs and base flows set for the mainstem and tributaries of 5 systems: the Chehalis, the Little Spokane, the Okanogan, the Methow, and the Coleville. Regarding the Okanogan Program in particular, Department of Game sources believe the plan is working because future permits are being curtailed.

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STATE MORATORIA ON NEW APPROPRIATIONS

I. Identification

Washington law provides three mechanisms for closing streams to further appropriation on a temporary or permanent basis. The first and oldest method is the refusal, by the Department of Ecology, which administers water rights, to grant a permit where the issuance of the permit would result in lowering the flow below that necessary to adequately support fish populations. The legal basis for this procedure is Rev. Code Wash. § 75.20.050, passed in 1949. This procedure is treated in detail elsewhere (see strategies entitled State Discretionary Water Permit Authority and State Appropriation of Instream Flow). The second method is the permanent withdrawal of a stream from further appropriation under a Basin Management Plan (see strategy entitled State Appropriation of Instream Flow). The third is temporary withdrawal of a stream from further appropriation until necessary studies have been made and a comprehensive Basin Management Plan has been formulated by the Department of Ecology. These latter methods are authorized by the 1971 Water Resources Act, Rev. Code Wash. §90.54. These latter two methods are related. The Department is under a mandate to formulate plans for all State River Basins and is proceeding to formulate them. When the temporary withdrawal procedures are invoked, appropriation is frozen while the Department of Ecology formulates its comprehensive plan. When these procedures are not invoked, appropriation of water may continue during the planning process.

II. Application

This strategy is likely to be applied in response to problems brought to light during the routine administration of Washington's water policy. A permit denial under Rev. Code. Wash. § 75.20.050, for example, would occur only after the following routine steps had been taken: application to the Department of Ecology for a permit, routine referral of the application to the Departments of Game and Fisheries for their recommendations, research by Departments of Game and Fisheries of their files for restrictions on the stream in question, and recommendation of denial (see strategy entitled Discretionary Water Permit Authority). Permanent withdrawal under a Basin Management Plan formulated by the Department of Ecology would occur only after all the administrative steps necessary to formulate and adopt the plan had been taken. However, the strategy might also be applied in an emergency situation. Temporary withdrawal under Rev. Code. Wash. 90.54 procedures would occur when no Basin Management Plan has yet been formulated and there is a conflict over water use which is brought to the attention of the Department of Ecology and which requires the calling of a moratorium on appropriation until priorities and needs can be settled.

Situations where a temporary moratorium is likely to be called are those in which, in the absence of a Basin Management Plan, water users and other interested parties who believe that the quantity or quality of water available to them will diminish or disappear before an equitable plan can be formulated. Parties involved would be any water user, citizen's groups, environmental groups, Department of Game, Department of Fisheries, and the Department of Ecology.

Implementation of this strategy is simple in the case of an Rev. Code. Wash. §75.20.050 action. The appropriate resource department, after checking its files and perhaps doing some observation in the field, makes its recommendations. The process is part of an institutional routine, and the costs apart from staff and record-keeping costs, are minimal.

Temporary withdrawal under Rev. Code. Wash. §90.54 is linked to the eventual formulation of a Basin Management Plan, which may or may not result in permanent withdrawal. It is necessarily a stop-gap measure and occurs, if at all, before the formulation of a plan. A temporary withdrawal might be granted by the Department of Ecology at the request of the Department of Game or the Department of Fisheries. Or, in a specific situation, parties who feared irreparable loss of water resources while a plan was pending might protest a permit application or challenge a permit already granted either in the Department of Ecology itself or in another State agency, such as the Pollution Control Hearings Board. By adopting the necessary regulations to withdraw the area from appropriation for a specified period or until a plan was formulated, the Department of Ecology has time to conduct its own research and for the protesting parties to conduct theirs. During the temporary withdrawal period, applications for water permits are held, pending completion of the plan. After a plan is adopted, they are processed in accordance with the policies established by the plan.

Implementing a permanent withdrawal under Rev. Code. Wash. §90.54 involves a more complex undertaking: the development of a comprehensive water management plan for the entire basin. This process consists of the following steps. First, the Department of Ecology generates public input by means of citizens' advisory groups, public workshops, and questionnaires. At the same time the Department conducts a technical evaluation consisting of field surveys of water use; research of water records (see strategy entitled State Water Rights Records Analyzed); computation of base flows (see strategy entitled State Appropriation of Instream Flows); and interagency consultation with both State and Federal agencies (see strategy entitled State-Federal Interagency Consultations). This public input and the technical evaluation result in a draft report which is reviewed, evaluated by the public and revised. Then regulations based on the report are written by the Department of Ecology. The Management Program and the regulations are again reviewed by citizens and interested agencies at public hearings; finally the plan is adopted. Following adoption, the plan is periodically reviewed by a standing committee of citizens. Costs to individuals, environmental groups, and resource agencies of participation in this process are chiefly those of time devoted to performing studies, attending hearings, and reviewing the plan at its various stages.

III. Illustration

Since the passage of Rev. Code. Wash. §90.54 in 1971 several Basin Management Plans have been completed (see strategy entitled State Appropriation of Instream Flow). Only twice have special temporary withdrawal regulations been adopted. One of these, that for the Little Spokane River Basin, expired upon adoption of a Basin Management Program for that basin. The other, which withdrew waters of the Little Klickitat River Basin from further appropriation, will be in effect until November 1, 1978, or until a management program is adopted, whichever is sooner.

The case of the Little Spokane illustrates the usefulness of this strategy in Washington. The Little Spokane River is a non-navigable stream with headwaters in three eastern Washington counties. Its main stream flows in a southerly direction to a point ten miles north of the City of Spokane, then westerly to the Spokane River. Land uses of the lower reaches were formerly farming, dairying, and cattle-raising; the current use is suburban development. Conflict over water uses developed in the basin over the years until, in 1972, a group of basin residents appealed a commercial irrigation permit granted by the Department of Ecology to the State Pollution Control Hearings Board. The conclusions of the Board were that the character of water use in the basin was changing from riparian rights and agricultural and irrigational uses to non-riparian appropriation rights and aesthetic and recreational uses. It also found that both flow and water quality had deteriorated, and that it was the responsibility of the Department of Ecology to regulate the situation.

The case was ultimately remanded to the Department of Ecology by the Supreme Court. Accordingly, the Department withdrew the public waters of the Little Spokane until June 30, 1976, or until a water management program had been developed, whichever occurred first.

The Department followed established administrative procedures to secure public involvement and sought recommendations from State resource agencies. Public input and technical evaluations established that the public wished to protect instream flows and to maintain a rural agricultural environment, and that water was available for future appropriation only along the mainstem of the Little Spokane. The management program adopted by the Department protects valid water rights in existence at the time of the program adoption, sets base flows equivalent to that available 80% of the time under natural fluctuating conditions (see strategy entitled State Appropriation of Instream Flow), makes all water rights granted subsequent to the adoption of the program subordinate to these base flows, retains lakes in their natural condition by limiting appropriations to domestic, stock, and nonconsumptive uses, and limits future appropriations to the mainstem of the Little Spokane. The program was ultimately codified as Chapter 173-550 of the Washington Administrative Code (WAC).

According to the Department of Ecology, a major difficulty in processing applications for new appropriations concerns applications for water rights from springs and unnamed streams which may or may not contribute to the flow of closed streams. The Department handles each of these applications individually. The Department anticipates that the quantity of water allocated for future appropriation is insufficient to honor all pending applications. Thus, when all pending applications have been processed, it is likely that the entire Basin will be closed to further appropriation.

Implementing this strategy for the citizens' group who initiated it involved making the decision to take their protest to the State administrative and judicial forums and the bearing of the costs of those contests. Other costs were borne by the Department of Ecology and other State agencies who contributed to the Water Resources Management Program.

IV. Evaluation

As the Little Spokane case illustrates, this strategy has been used successfully in the past, both to obtain a temporary withdrawal from appropriation pending appropriate administrative action, and to permanently withdraw a stream from future appropriation. The costs to the State of Washington of applying this strategy are high, since an entire State agency had to be created in order to create and apply the general water policy illustrated by the Little Spokane plan. The strategy appears to be worth the cost, however, in that it does provide a relatively efficient way to stop overappropriation and prevent the total dewatering of the State's streams.

There are certain legislative and judicial constraints on the strategy. Certain beneficial uses, for example, domestic supply and stock use, take precedence over instream flow use.

Existing rights are not affected by either a temporary or a permanent withdrawal. Administrative constraints also exist. First, the time needed to formulate a comprehensive plan -- 5 or 6 years -- is a constraint. Second, formulation of a plan requires an immense commitment of State resources. Third, a temporary withdrawal is only a stop gap solution. Fourth, enforcement of the Management Plan is difficult since enforcement staff, stream patrolmen and the like, are in short supply. Fifth, base flows computed under a Management Plan may prove insufficient. Last, plans may be revised and instream flows may be diminished as demands for consumptive uses grow.

Despite these constraints, the Department of Ecology, the Department of Game, and the Department of Fisheries are confident that this strategy will be effective in the future.

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STATE DISCRETIONARY WATER PERMIT AUTHORITY

I. Identification

Administrative supervision of Washington's water resources is vested in the Department of Ecology. The Director of the Department, with the advice of an Ecological Commission, is responsible for carrying out the Department's powers and duties, including approval of applications for permits to appropriate water. The procedures to be followed to perfect a water right are specified in the 1917 Water Code.

This process begins when an application is filed with the Director of the Department, who then issues a temporary permit pending determination of the application; notice of the application then must be published in the appropriate county. In order to approve an application and issue a permanent permit, the Director must first find that there is unappropriated water in the source, and second, that the proposed use would not conflict with existing rights or the public interest. The Department of Ecology may issue a permit without conditions or limitations. It may deny an application for a permit where existing rights or the public interest require denial or where the stream is already fully appropriated; it may also issue a permit subject to conditions or limitations (for an explanation of enforcement procedures see strategy entitled State Appropriation of Instream Flow.

The legal basis of this strategy is legislation passed in 1949 which enabled denials of water right applications when further appropriations ". . . might result in lowering the flow of water below the flow necessary to adequately support fish populations (Rev. Code. Wash.§ 75.20)." This Act allows the Department of Ecology to close streams to further appropriation. The Minimum Water Flows and Levels Act of 1969 and the Water Resources Act of 1971 further provide for maintaining flows in streams for fisheries and other ecological values.

III. Application

This strategy is designed so that fish and wildlife interests petition the Department of Ecology to recognize instream flow needs on granting permit applications with administrative discretion. The Department of Ecology routinely sends all applications for water permits to the State Department of Game, which has jurisdiction over sport fisheries, and the Department of Fisheries, which is in charge of commercial fisheries, for advisory comments.

These Departments evaluate the permits on a case-by-case basis; the evaluation includes reviews by fish biologists including if possible field studies done during the low flow (summer) period. These studies can be expensive. The Department records are consulted for information about the stream involved. Previous protests and recommendations issued by the Department are referred to in formulating current recommendations in the public interest. The Department of Ecology would then deny or amend the application if it believes the Departments of Game and Fisheries recommendations were in the public interest. The cost of this strategy are those incurred as a result of field studies of streams under consideration, and those involved in obtaining hydrological and biological data to support the fish and wildlife interest position.

III. Illustration

The denial of the application of Melvin E. Pitts, Port Orchard, Washington, illustrates the successful application of this strategy by the Washington State Department of Game. The application proposed to appropriate water for a continuous domestic water supply from an unnamed stream tributary to Salmonberry Creek for the irrigation of a tract of one and one-half acres located in Colby Garden Tracts. Analysis of the application itself provided some of the grounds for requesting denial: the legal description appearing on the application described approximately 3 acres of land; the attached map showed that the residence involved in the application was not located on that tract. Since "domestic supply" according to current standard Department of Ecology operating procedures, means normal use within a residence and normal maintenance of grounds not to exceed one-half acre and associated with a residence, the application did not qualify. Other grounds for denial were provided by a field inspection of the site by a Department of Ecology examiner, which showed that the ground was cleared for irrigation, that the residence was not located on the property described as the place of use, and that an old diversion system existed and was apparently being used for irrigation of acreage in excess of that normally associated with domestic needs. A check of Department of Ecology Records showed that the stream system in question had been closed to irrigation by request of the Departments of Fisheries and Game since 1948 and that the applicant had been notified of that fact prior to submission of the application for domestic use.

Correspondence between the Department of Game and the Department of Fisheries further revealed that Salmonberry Creek was populated with coho salmon the year round, that their numbers were limited by low flows and that further reduction in flow would reduce the population. The Department of Fisheries observed that the stream was closed to consumptive diversion in 1948 and asked that the application be denied. The Department of Game joined in this recommendation. The fish and wildlife agencies incurred some expense in reviewing the application and file information to formulate their protest.

The Department of Ecology denied the permit, observing that an alternate source was available and that to issue a permit in degradation of established standards merely because the water was already being used would encourage noncompliance with the water code.

IV. Evaluation

This strategy has been successfully applied in Washington. A system for the review of water rights applications by the Departments of Game and Fisheries has been institutionalized; applications are forwarded to the Departments for review, and procedures for review and for field investigation by the Department of Ecology have been worked out; a records system is available and forms for recommendations have been developed.

Though procedures exist and are often employed for issuing permits with conditions, for example allowing a diversion of a limited number of cfs or acre-feet per year, but requiring that the intake be screened, that no dam be built, and that all diversion shall cease when the stream flow falls below a specified number of cfs, personnel in the Department of Game believe that conditional permits are much less satisfactory than denial. They reason that once the user has a permit, he will expand his operations in dependence on it, assuming that water will always be available. Then, in periods of low flow, the conditions may prove to be unenforceable because the user can argue that he will suffer economic loss if he is forced to comply. If the decision is made in a court on the equities, fish and wildlife flows protected only by such a condition may very well be lost. Since Washington law has since 1949 allowed closing a fully appropriated stream to further appropriation, the Washington Departments of Game and Fisheries are better able to protect instream flows for fish and wildlife by recommending denial of the permit.

Sources in Game and Fisheries agree that the Department of Ecology is both cooperative and responsive to their recommendations and that the recommendations are usually followed.

Costs involved in this strategy are chiefly those incurred as a result of field checks on applicants and those involved in gathering hydrological and biological data to support Department recommendations. However, the availability of Departmental records, cooperation between Game and Fisheries, and access to the Department of Ecology record system help to keep costs at a minimum.

A constraint on this strategy is its case-by-case nature. New applications keep being made and must be responded to, even where the stream involved has long been closed to further appropriation. Another constraint is the difficulty of enforcement. As the Department of Ecology has pointed out in another connection (see strategy entitled State Water Rights Records Analyzed), it lacks personnel to patrol and report on each of these streams. Enforcement of the permit system is dependent in large part upon other holders of water rights. Presumably the Departments of Game and Fisheries are even less likely to have personnel available to check on permit compliance since such a task is not part of their statutory duty. However, despite these constraints, this strategy is likely to be useful for future protection of instream flows for fish and wildlife.

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LEGISLATIVE AND ADMINISTRATIVE CONTROLS

FEDERAL REAUTHORIZATION OF PROJECTS

I. Identification

Reauthorization of a Federal water resource project to provide for increased flow releases so as to reserve instream flows involves Congressional passage of legislation modifying the original authorizing legislation. After the sponsoring construction agency conducts feasibility studies, which include comments of the Fish and Wildlife Service, the appropriate Congressional Committee drafts new legislation or amends the original authorizing legislation. The legal basis of this strategy is the Congressional authorization process for water resource projects and construction agency guidelines and procedures for authorizing and modifying water resource projects.

II. Application

This strategy may be pursued when the reauthorization of a water resource project could rehabilitate or markedly improve the downstream fishery. Interest groups of fishermen or conservationists might instigate this strategy, the Fish and Wildlife Service or Washington Departments of Fisheries and Game. A U.S. Senator or Representative could introduce reauthorizing legislation. Realistically, however, for this strategy to be successful, the construction agency, such as the Bureau of Reclamation or Corps of Engineers, must initiate the process by agreeing to study reauthorization and support it before Congress.

There is a number of important decision points in the formulation and implementation of this strategy. Those encouraging the strategy must decide to lobby the construction agency for action. The construction agency must decide whether to support a study of reauthorization. Once a study is completed, the construction agency may decide to modify the project and, if so, must also decide whether to seek Congressional reauthorization. If the modification is minor, the construction agency has the discretionary authority to alter project operations without Congressional approval. In instances involving instream flows, however, the construction agency would probably seek Congressional approval because of the normally controversial nature of such a modification. To secure the approval of Congress, the construction agency would conduct and submit a feasibility study justifying the proposed change.

Legislation reauthorizing a Bureau of Reclamation project must be approved by the Subcommittee on Water and Power Resources of the House Committee on Interior and Insular Affairs and by the Subcommittee on Public Lands and Resources of the Senate Committee on Energy and Natural Resources. Corps of Engineers projects must be approved by the Subcommittee on Water Resources of the House Public Works Committee and by the Subcommittee on Water Resources of the Senate Committee on Environment and Public Works. After reviewing the feasibility report of the construction agency, these committees must decide whether to reauthorize. According to Congressional staff members, as long as there is no significant political opposition, the committees will approve the reauthorizing legislation.

This strategy is costly in terms of money and time. The construction agency and fish and wildlife agencies must fund and conduct a feasibility study to justify the modification and reauthorization of a project already planned and constructed. The reauthorization process takes almost as long--5 to 10 years--as the original authorizing process. The legislation must then be approved by both houses of Congress and signed by the President.

III. Illustration

While this strategy has not been applied in Washington, an example from Wyoming will illustrate its usefulness. Kortes Unit, a component of the Missouri River Basin Project in Wyoming, was reauthorized for fishery conservation in 1971 by the passage of P.L. 92-146. Specifically, the Secretary of the Interior was instructed to maintain a minimum streamflow of 500 cfs in the reach of the North Platte River between Kortes Dam and the normal headwaters of Pathfinder Reservoir. However, when water sufficient to operate the unit in this manner is not available, water must be reserved for hydroelectric power peaking operations, and any remaining water will be released for conservation of the fishery resources.

Before construction and operation of Kortes Unit, the stream reach below the dam site contained an excellent trout fishery. However, once Kortes Unit was built, this resource began to deteriorate. Fish kills would frequently occur due to shut-downs of the Kortes hydroelectric plant. Fishermen and area residents were concerned about the destruction of this valuable fishery. Acting upon this concern, the Fish and Wildlife Service and the Wyoming Game and Fish Department convinced the Bureau of Reclamation in 1963 that field studies of various flow regimes should be made. The result of these studies, which were partially funded by the Bureau of Reclamation, was a recommendation to the Bureau that the operation of Kortes power plant be modified to assure a continuous flow of at least 500 cfs between Kortes Dam and Pathfinder Reservoir. In 1964, the Bureau of Reclamation began releasing 500 cfs pending Congressional reauthorization.

In September 1966, the BR completed a special report for the purpose of securing Congressional approval to change the operation of the Kortes Unit from a single-purpose hydroelectric power development to a dual-purpose development with fish and wildlife enhancement as a secondary purpose. The report analyzed the benefits, costs, revenues, and cost allocations with and without the fishery flow. For economic justification, it concluded that the adverse effects at Kortes would be more than offset by the benefits of fishery enhancement. In fact, the benefit-cost ratio increased from 1.31 to 1.36.

In this illustrative situation, important decisions were made by the Fish and Wildlife Service and the Wyoming Game and Fish Department in seeking reauthorization; the Bureau of Reclamation in agreeing to conduct field studies and prepare a report to secure Congressional approval; and the Congressional Committees in supporting the Bureau's position. The fish and game agencies' action was greatly influenced by the valuable fishery at stake while the Bureau's decision was primarily influenced by the great demand for, and little opposition to reauthorization. No economic interest, such as an irrigation district or a municipality, was opposed to reauthorization. The increased benefit-cost ratio from the proposed modification was less important since the project prior to reauthorization was already cost-effective. Although the maintenance of instream flows could result in decreased power production from Kortes Unit, the Bureau of Reclamation could recoup these losses from other hydroelectric projects in the same system. Finally, a positive decision by Congress was assured because of the lack of opposition to reauthorization.

The reauthorization of Kortes Unit took approximately 8 years and incurred substantial cost in time and money among all parties involved. These commitments drained some of the limited resources of construction and fish and wildlife agencies.

On the positive side, increased flow releases were provided almost immediately after the fish and game agencies completed their study and continued for seven years while project reauthorization was in process. These increased reservoir releases have usually sustained the prescribed minimum flows downstream and restored the downstream fishery.

IV. Evaluation

As shown by the illustration, the strategy of project reauthorization can successfully provide for increased flow releases. For several reasons, however, reauthorization is an unusual occurrence, particularly for fish and wildlife purposes. Once a water resource project is constructed and operating, the fishery interests and the construction agencies have little incentive to incur the expense and time needed to reassess project operations unless a combination of distinctive factors is present. As illustrated by the Kortes Unit reauthorization, the most important factors are the threat to a valuable resource, great demand for project modification, and absence of organized opposition. Although, the FWS and Departments of Fisheries and Game have not utilized this strategy, these agencies indicate that this strategy merits further consideration. The Department of Game indicates that this strategy is particularly suitable for the Columbia Basin Project operated by BR. The Department of Game, however, indicates that strong opposition to reauthorization could be expected from farmers served by the project.

Other factors in the successful outcome included increased benefits from reauthorization and the ability to recover the losses caused by changing the use of some water stored in the Kortes reservoir. If the right combination of factors does occur, this strategy offers two noteworthy advantages. It provides a long-term solution with a firm legal basis. The reauthorizing legislation legally guarantees the necessary flows in perpetuity or until the legislation is again amended.

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STATE-FEDERAL WILD AND SCENIC RIVERS SYSTEM

I. Identification

The addition of a stream segment to the Federal Wild and Scenic Rivers System, which provides for reservation of flows sufficient to accomplish the purposes of the Act, involves administrative and/or legislative action provided by the National Wild and Scenic River Act (P.L. 94-486). Designation as a wild or scenic river has the effect of reserving historical instream flows since new stream diversions and impoundments are prohibited, and may be restricted below or above the designated river segment. If a river is to be managed entirely or partly by a Federal agency, or if it lies wholly or partly within a National Park, Forest, Wildlife Refuge or other Federal land, an act of Congress is required. The Secretary of Interior can grant a Federal designation if the river is part of a state river protection program. In May 1977 the Washington Legislature provided that certain selected rivers of the state and their immediate environs "shall be preserved in as natural a condition as practical and that overuse of such rivers, which tends to downgrade their natural condition, shall be discouraged." Senate Bill 3002.

II. Application

This strategy can be applied where a free-flowing river or stream segment is at least 25 miles long and bordered by a visually appealing landscape. The Wild and Scenic Rivers Act defines river segments as wild, scenic, and recreational:

> "Wild river areas are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic river areas are free of impoundments, with shorelines largely undeveloped, but accessible in places by roads. Recreational river areas are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past."

The Forest Service and the Heritage Conservation and Recreation Service, formerly the Bureau of Outdoor Recreation, have published clarifying guidelines for determining river segment classifications.

Although the Washington Departments of Fisheries and Game, the Fish and Wildlife Service, and the HCRS may be able to initiate action by local interests, the local citizens themselves must organize and demonstrate local support to convince their Member(s) of Congress to introduce a bill. Also, the HCRS is conducting a national inventory to determine suitable segments to recommend to Congress for detailed study.

Congress must pass a bill authorizing a study of the river in question. Such bills must go through the legislative process, including hearings before the House Interior and Insular Affairs Committee and the Senate Energy and Natural Resources Committee. If a study bill passes and is signed by the President, the Forest Service--if the river flows through a National forest, or the HCRS in all other cases--will work with State and local officials to inventory the river's resources and solicit views of the local landowners and citizens.

The study may cost approximately $200,000. If the river proposed meets the criteria, the study team will recommend:

- Classification of various river segments
- Acreage to be included in the river corridor
- Acquisition of land and easements
- Development of recreational facilities
- Assignments of a managing agency.

The study report, along with a Draft Environmental Impact Statement and a Draft Management Plan, is reviewed by agencies including the FWS and the State fish and game agency, by the public, and then submitted to Congress and the President. After clearance by the Office of Management and Budget, the President makes a recommendation to Congress. Given sufficient interest, Congress will schedule hearings to discuss the study report. Congress is free to accept all, some or none of the recommendations. If Congress passes a bill which approves the designation(s) and the President signs it, the agency to administer the river segment will prepare detailed boundaries for the river corridor and prepare a Comprehensive Management and Development Plan. Congress must then appropriate money for acquisition of land and easements, construction of visitor facilities, and operating expenses such as salaries of river administrators.

The Congressional designation of a river segment takes several years from the time that Congress authorizes a study. Once a river is declared a study river, it must be designated within 10 years or dropped from consideration. However, the Federal Act protects the river segment under study from the authorization, funding and construction of water resource development projects, as well as restricts development above and below the study segment which would have an adverse effect. The Secretary (Interior or Agriculture charged with the administration of the river segment would determine if the values for which the river was designated would be adversely affected by development. The Act also protects these rivers for up to three years after the study report is submitted to Congress and the President, regardless of whether or not the river is to be included in the System. All minerals located on Federal lands within one-quarter mile of a study river are withdrawn from prospecting or leasing during the study period.

III. Illustration

In October 1968, upon Congressional enactment of P.L. 90-542 the Skagit River System was designated as one of 27 "study rivers" for potential inclusion into the National Wild and Scenic Rivers System. In his Environmental Message of 23 May 1977 President Carter recommended that Congress add 157.5 miles of rivers in the Skagit River basin to the National Wild and Scenic Rivers System. The Forest Services's Final Environmental Statement on this proposal was filed with the Council on Environmental Quality on 17 June 1977.

The FS proposal recommends that the Skagit River from the pipeline utility corridor at Sedro Woolley upstream to Bacon Creek be added to the National System as a recreational river, this segment is 58.5 miles in length. The Cascade River is recommended for scenic classification from its junction with the Skagit upstream to the junction of its North and South Forks, and up the South Fork to the Glacier Peak Wilderness boundary, a total of 20.8 miles. The Sauk River would be classified scenic from its junction with the Skagit upstream to Elliot Creek, and up the North Fork Sauk to the Sauk to the Glacier Peak Wilderness boundary, 50.8 miles. The Suiattle River would be classified scenic from its junction with the Sauk River upstream to the Glacier Peak Wilderness boundary, 27.4 miles.

Prior to the final EIS, the Forest Service conducted a study, held public hearings, and solicited agency reviews from 1970 to 1977. Coordination of all Washington State agency activities was provided by the Washington Department of Ecology, which had been designated by the Governor to assume this role for the Skagit River Study. Apparently, both the FWS and the Washington Department of Fisheries only provided reviews of the draft and final EIS and the management plans. The Department of Game provided limited technical assistance to FS biologists for their reconnaisance studies, as well as a review of the environmental statements and management plan. According to FWS personnel, the FS has its own biological expertise, which is capable of providing much of the necessary fish and wildlife resource data.

The Skagit River system is one of the few remaining systems in America, which supports significant numbers of the five salmon species native to North America, plus the three seagoing varieties of trout. The system's fishery produces an average of 2.2 million anadromous fish each year. About a half million return to spawn, while the balance is harvested by commericial and sport fishermen and natural predators at sea. These fish represent 20% to 30% of the Puget Sound anadromous fish harvest. Also, this basin is reported to support the largest winter concentration of bald eagles in the continguous United States. A small number of the eagles, however, are permanent residents of the basin. Many additional eagles visit the basin during the height of the anadromous fish migration to feed.

Opposition to the inclusion of the Skagit, Cascade, Sauk, and Suiattle Rivers into the National Wild and Scenic Rivers System comes from private land owners in the classified area. Many oppose classification because it might usurp some of their property rights, prohibit the construction of some portions of flood control projects, and prohibit future bank stabilization work. Further opposition was expressed by Governor Dixy Lee Ray in September 1977, reversing the position of her predecessor, who supported the FS proposal. The primary consideration was 1977 Washington State legislation providing for the preservation of selected rivers "in as natural a condition as practical and that overuse of such rivers, which tends to downgrade their natural condition, shall be discouraged." Governor Ray considered this legislation to be adequate for protecting the Skagit, thus, negating the need for Federal protection. Furthermore, Governor Ray was concerned that designation of the Skagit would preclude hydroelectric development and the Skagit nuclear site even though both these developments are outside the designated area. A detailed Department of Agriculture study subsequent to the Governor's announced opposition concluded that the Skagit nuclear power site would not be affected by the designation of the Skagit River system as "scenic" and "recreational."

IV. Evaluation

As illustrated, this strategy is being applied in Washington under the National Wild and Scenic River Act. Designation of the Skagit River System is expected to effectively preserve 157.5 miles of aquatic habitat. Washington has not applied its State wild and scenic rivers designation to any rivers.

The designation of a river or stream segment under the National Wild and Scenic Rivers Act (section 13, part c) tends to reserve flows in quantities sufficient to accomplish the purposes of the Act. The Act prohibits new water resource development in the designated segment and restricts water resource development upstream and downstream which would adversely affect the designated river segment. It is a serious shortcoming, however, to take this approach to reserving flows without actually quantifying the streamflow regime that underlies the wild or scenic river designation, and monitoring the flows to ensure their maintenance possibly by augmenting deficient flows with reservoir releases upstream from designated segments. The Act does not prohibit existing water users along a designated river segment from continuing their use; it only prohibits new appropriations. In fact, the Act states that any taking by the United States of a water right which is vested under either State or Federal law at the time a river is included in the national System shall entitle the owner to just compensation.

Inclusion in the System also protects the river segment from Federally funded water resource development. Therefore, no Federally funded dams and reservoirs will be built on designated river segments. However, this in no way guarantees that sufficient flows will occur to preserve the developed fish and wildlife resources. Some means of linking instream flow needs of fish and wildlife to this process for streamflow protection will be necessary. In 1977, the FWS, in conjunction with western state fish and game agencies, conducted a study which identified and mapped stream segments having substantial fish and wildlife value. The results from this study may be used by the HCRS when it expands its own study in 1978 to identify additional stream segments for inclusion in the Wild and Scenic Rivers System.

Future effectiveness of this strategy will depend on developing and maintaining local support and be constrained by the substantial costs involved in its implementation. The Congressional approval required to study a river segment and include it in the national system may take several years. Nevertheless, the strategy does provide for a permanent maintenance of historical flows and prohibits future Federal development. Its future effectiveness will hinge most of all on relating streamflow maintenance to quantifiable fish and wildlife values. This quantitative link is not inherent in the National Wild and Scenic River Act, but it may be possible to bridge the gap administratively.

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STATE DEFINITION OF NAVIGABLE WATERS

Determination of a river as being navigable under State statute provides the opportunity to ensure that flows remain sufficient to support navigation, and also the maintenance of the aquatic habitat for fish and wildlife. Even though Washington has adopted a number of statutory provisions relating to the navigable waters of the State, none of the provisions allow for the application of this strategy. These include statutes regulating the activities of the vessels (Rev. Code. Wash., chs. 88.04 and 88.20), a pilotage act (Rev. Code. Wash., §88.16.010), river and harbor improvements (Rev. Code. Wash., §88.32.010), wharves and landings (Rev. Code. Wash., §88.24.010), and obstructions in navigable waters (Rev. Code. Wash., §88.28.010). Commercial waterway districts may be created for the construction and maintenance of a system of commercial waterways in the State. Such districts may straighten, widen and otherwise improve navigable waterways (Rev. Code. Wash., chs. 91.04, 91.06, 91.07 and 91.08). A canal commission has also been created to aid commerce and navigation, including the development of associated recreational facilities (Rev. Code. Wash., ch. 12). Although the issue of navigability has been judicially addressed in Washington, court findings do not allow for the application of this strategy. In Kemp v. Putman, 27 Wash. 2d 530,288 P.2d 839(1955) the court determined that navigable waters include waters which are navigable for general commercial purposes and the determination of navigability is a question of fact. The application of this strategy, apparently, is infeasible under existing Washington statutory and judicial law.

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STATE-FEDERAL INTERAGENCY CONSULTATIONS

I. Identification

Whenever a Federal agency constructs, modifies, or licenses a reservoir project, it must consult with the Fish and Wildlife Service and the Washington Departments of Fisheries and Game to obtain and consider their recommendations concerning fish and wildlife resource preservation and development, including the provision of instream flow. Refining and formalizing this consultative process is the goal of this strategy. The formulation and adoption of interagency agreements, construction or permit agency regulations or formal procedures, and strict enforcement of these requirements are tactics available to implement this strategy.

The legal or administrative basis for this strategy is the Fish and Wildlife Coordination Act (FWCA) and the regulations or procedures the Federal construction and permit agencies have developed to implement the Act. The FWCA (P.L. 85-264) passed in 1958, expanded upon the Act that created the FWS in 1946 (P.L. 79-232). The FWCA requires that full consideration be given to the recommendations of the FWS; the 1946 Act only required consultation between the construction agency and the Federal and state fish and game agencies.

II. Application

The FWS, the Departments of Fisheries and Game and a private interest group are the parties who would instigate this strategy. At the present time, neither the Bureau of Reclamation, Soil Conservation Service, Forest Service nor Bureau of Land Management have an interagency agreement with the FWS at either the regional or headquarters level to implement the FWCA. The Corps of Engineers has a cooperative agreement with the FWS, enacted in 1954. This agreement will be discussed as an illustration of this strategy. All of these agencies, though, do have formalized procedures to implement the FWCA. In addition, the Corps will soon be issuing regulations concerning their implementation of the FWCA. A review of these procedures and proposed regulations is necessary to assess the decision-making and costs involved in implementing this strategy.

According to the Bureau of Reclamation policy, coordination in all phases of planning should include:

- Early notification by the BR of the initiation of planning studies
- Opportunity for the FWS to participate in the formulation and evaluation of project plans
- Opportunity for the FWS to provide reports to the BR, including recommendations relating to fish and wildlife aspects of plans or proposals.

FWS reports on BR projects are funded by the Bureau. Congress allocates funds to the FWS through the BR's Washington office which disburses funds to the FWS through the Regional Offices. Beginning in 1978, such funds will not be earmarked in the appropriation act and disbursed from Washington, but rather will be transferred at the field level.

Although not referring explicitly to the FWCA, the SCS procedures do specify that Federal and state fish and wildlife agencies be encouraged to participate actively in project planning and to incorporate measures needed in each project to the maximum extent feasible. According to Forest Service procedures,

> . . . it will be the policy of the Forest Service to refer to the Fish and Wildlife Service and/or the appropriate state fish and wildlife agency, all proposed projects which have a potential for affecting fish and wildlife resources to such an extent as to warrant the investigation and recommendations of these agencies.

The BLM's regulations and procedures do not refer to the FWCA, but their new organic act, the Federal Land Policy and Management Act of 1976 (P.L. 94-579), indicates that fish and wildlife values will be considered in granting permits for rights-of-way. Conditions to guarantee these values, such as minimum releases from reservoirs to augment instream flows, can be inserted in the permits.

The Corps draft regulations stipulate that the District Engineer, at least every six months, provide the Regional Director of the FWS with information concerning all pre- and post-authorization studies. This information will be helpful to the FWS in making decisions on personnel requirements and preparing investigative schedules. The draft regulations also require the District Engineer to notify the Regional Director of the initiation of any project investigation and coordinate with the FWS throughout the investigation. The District Engineer must consider to the fullest extent practicable the recommendations of the fish and wildlife agencies.

Beginning with FY 1978, funds for the FWCA studies will no longer be budgeted as line items and transferred at the headquarters level. Rather, the District Engineer, after consultation with the FWS Regional Director, will include in his budget the funds necessary for the FWS to comply with the FWCA. The new draft regulations state that local entities must pay for the cost of water released for instream purposes. Also, local entities must furnish assurances that appropriate action will be taken to prevent downstream withdrawals of water that could negate fishery benefits credited to such releases.

In pursuing this strategy, the FWS can seek agency regulations or interagency agreements based on unilaterally adopted procedures, attempt to strengthen present procedures, or see that they are enforced on a project by project basis. If interagency agreements or agency regulations are to be drawn up, or existing procedures made more stringent, the required decision-making would occur at the policy-making level of the FWS, not at the field level. To enforce the existing procedures, however, decision-making must be at the field level.

In terms of personnel, time and money, the costs involved in implementing this strategy could be quite high. They would vary depending on the tactic that is used. Of the several tactics available, enforcing existing procedural requirements would probably incur the highest cost because it involves project by project application, yet this tactic may carry the greatest payoff.

III. Illustration

In 1954, the FWS and Corps of Engineers enacted an interagency agreement to cover the Coordination Act of August 14, 1946, which, when subsequently amended, became the Fish and Wildlife Coordination Act (FWCA) of 1958. This agreement established guidelines for CE consideration of FWS recommendations for fishery preservation in planned water resource projects.

These guidelines stipulated that the District Engineer shall incorporate in a project report all recommendations of the FWS which are satisfactory to him, including, or course, recommended instream flow reservations. The District Engineer must explain in the report his reasons for rejecting those recommendations he found unsatisfactory. Although there is no provision in this interagency agreement for pre-project coordination, the CE is supposed to include fish and wildlife conservation as a project purpose if the effects of a project on fish and wildlife resources would be significant. In Washington the FWS could not ascertain the impact of this agreement upon CE projects.

IV. Evaluation

It is difficult to determine the utility of this overall strategy. It is first necessary to ascertain what effect the Fish and Wildlife Coordination Act of 1958 has had on reserving instream flows. Strengthening the implementation of the Act through the application of the various tactics covered under this strategy could be expected to increase the probability of flow reservations.

A study performed by Enviro Control of instream flow recommendations made in Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington and Wyoming indicated that flows recommended after the 1958 amendments (FWCA) were accepted significantly more often than prior to that time. The fishery was maintained or improved significantly more often in the post-1958 projects than in the projects built before that time. However, there are no reliable statistics to gauge the success of flow recommendations in the last few years when procedures have become even more stringent.

Although the passage of the Fish and Wildlife Coordination Act of 1958 may have helped to reserve instream flows, making this Act more effective is the goal of this overall strategy. Enacting interagency agreements may be a promising tactic. On the other hand, the CE 1954 agreement is the only one presently operative. Construction and permit agencies probably would be unwilling to draw up such rigorous agreements since their own formalized procedures already contain most of the features in such an agreement. A distinct advantage of interagency agreements, in contrast to unilateral agency procedures, is that the FWS would have more of an opportunity to insert provisions it deems necessary. Also, an interagency agreement may imply more commitment on the part of the cooperating agencies. These characteristics, though, may explain why the Federal construction and permit agencies prefer merely formalizing their own procedures.

The strengthening of present procedures, even to the extent of adopting formal regulations which are more binding, may prove a promising tactic. The National Wildlife Federation has filed a petition in 1977 with the Department of the Interior, Department of the Army, and the Council on Environmental Quality to compel Federal construction and operating agencies to adopt formal procedures in reviewing FWS recommendations for mitigating the adverse impact of development upon fish and wildlife habitats. The petition seeks to alleviate the dependency of the FWS on the construction agencies for transfer funds by having mitigative features funded and implemented concurrently with project construction, or in advance of project construction where there may be interference withthe achievement of mitigative goals.

The Wildlife Federation is optimistic that the petitioned agencies will draft formal review procedures. However, the agencies are not expected to fully comply with the petition, but they are expected to take significant steps toward the desired end. For instance, the Corps has drafted new procedures and regulations but they will not be formalized until other petitioned agencies complete their drafts. This petition relies upon existing legislation (FWCA) which avoids the ptifalls of introducing new legislation into Congress.

Another promising tactic is promoting the enforcement of existing procedures and regulations. The construction and license agencies, having issued these requirements, are officially committed to them. Issued by the agencies' main offices in Washington, D.C., these procedures or regulations are not always adhered to in the field. This may be attributed to negligence or mere unfamiliarity on the part of the construction and permit agencies. Also, some FWS Field Offices may be unaware of construction and permit agency procedures.

The major costs involved with the tactics subsumed under this general strategy would result from drafting procedures, regulations or agreements, and attempting to convince the construction or permit agencies to adopt them. The costs, to a large extent, are a function of the cooperation proffered by the agencies solicited.

A major constraint on the effectiveness of this strategy would be the difficulty the FWS would have in determining whether or not the procedural requirements are being honored. FWS knowledge of project planning and development depends on notification by the construction or permit agency. Notification may be delayed until late in the planning phase. Conceivably, the FWS would spend substantial time and effort in trying to be cognizant of project planning programs if it is not properly notified.

Even if proper notification is made, successful implementation of agency procedures for cooperation with fish and wildlife interests is dependent on the availability of funding and personnel. The FWS incurs significant cost when detailed investigations are conducted in the field and subsequent recommendations are formulated for planned projects such as dams and reservoirs. Although the construction agencies transfer funds to the FWS for this purpose, these may not be adequate. Hopefully, this situation may improve, at least as it involves the BR and CE, because of the new funding procedure that the Bureau and Corps will initiate in fiscal year 1978. Transfers of General Investigation funds will be made at the regional level following negotiations of appropriate amounts with the respective FWS Regions. These transfers will be made by memoranda of agreement executed by the affected agency field offices. The FWS Area Office (Olympia) perceives both advantages and disadvantages with the new funding arrangements. Regional funding ceilings may tend to limit FWS involvement under the FWCA in BR and CE projects forcing these agencies to contract out for the necessary studies. Regional funding will, also, greatly strengthen the power of the constructing agencies regional administrator. The new funding arrangement, however, will provide greater latitude in project negotiations.

Another constraint upon the effectiveness of this strategy is the lack of an enforcement mechanism. If a field office of a permit or construction agency does not conform with its own procedures or an interagency agreement, the FWS can take no action other than lodging a complaint with the offending agency. The pending adoption of CE regulations is a step in the right direction because the regulations will have the force of law. Concerning the Forest Service and BLM, regulations to be issued in accordance with the Federal Land Policy and Management Act of 1976 (P.L. 94-579) may also afford further protection to fish and wildlife.

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FEDERAL LICENSE AND PERMIT STIPULATIONS

I. Identification

The inclusion of a minimum flow stipulation in a dam and reservoir project license or permit ensures that flows will be required to be released as a matter of legal right. To ensure that minimum flows are legally required as an integral part of project operations, it is essential that fish and wildlife interests take an active part in the licensing or permit process involved with an application for use of land and water under Federal ownership or control.

The legal basis for this strategy in relation to Forest Service and BLM-controlled lands derives from the Federal Land Policy and Management Act of 1976 (P.L. 94-579). Conversations with the FS and BLM have pointed out that, until pending regulations are issued pursuant to P.L. 94-579, the permit process for these agencies will continue to maintain vestiges of previous legislation which regulated acquisition of Federal lands. The legal basis with regard to the Federal Energy Regulatory Commission derives from the regulatory authority of the FERC over the non-Federal hydroelectric industry. As a quasi-judicial commission of the Department of Energy, it licenses construction, operation, and maintenance of dam and reservoir projects utilizing waters and lands of the United States under the mandates of the Federal Power Act of 1920 and other Federal laws.

II. Application

This strategy may be utilized when it is determined that a minimum instream flow is needed downstream from a proposed reservoir project requiring a permit or license or subject to relicensing. Participating parties in this strategy would be the Federal agency in control of the affected land and water resources, the project permittee or licensee,and an interested party advocating fish and wildlife interests such as the FWS, the Washington State Department of Game, or the Washington State Department of Fisheries. In the case of a FERC-regulated project, any person or group of persons whose participation may be in the public interest could participate.

The permit process followed by Forest Service and BLM are similar. This discussion will focus on this process as it relates to the Forest Service. Presently, the critical point at which fish and wildlife interests may exert pressure for instream flow stipulations in the project permit occurs after the applicant has submitted a plan of construction, operation, and rehabilitation of the porposed right-of-way in National Forests. At this time, an impact survey is performed by the FS which must contain the "views of the Fish and Wildlife Service...and State fish and game departments where fishery and wildlife values are of importance. The Forest Supervisor will ask the Fish and Wildlife Service and State fish and game departments for a report." At this point the interested fish and game agency should submit its minimum flow recommendations and any studies documenting the efficacy of the suggested flow regime in providing for fish and wildlife habitats.

Upon receiving the plans of the applicant and reviewing the completed impact survey, the FS determines whether the land in question can accomodate the proposed use. If an affirmative determination is made, a permit is granted.

Permits normally contain a list of terms and conditions. Section 505 of P.L. 94-579 states that one of the purposes of the terms and conditions is to minimize damage to scenic and aesthetic values and fish and wildlife habitats, and to otherwise protect the environment. Upon granting the permit with accompanying terms and conditions, the applicant must submit detailed plans of construction to the FS. If these plans comply with requirements of the permit, construction may then proceed.

Within this process, it is important that the interested fish and wildlife agency make a specific instream flow recommendation to the Forest Supervisor when asked to comment on potential project impact. Such action will ensure that a minimum instream flow will be considered for inclusion in the final project permit as part of the terms and conditions of project operations.

In the FERC licensing process, there are two critical points at which proponents of this strategy may exert influence. The first point occurs during the applicants' preparation of the Application for License of which Exhibit S is a component. Exhibit S, as described in 18.CFR 4.41, Rules of Practice and Procedure, requires that:

> The Applicant shall prepare this exhibit on the basis of studies made after consultation and in cooperation with the U.S. Fish and Wildlife Service, Department of the Interior and appropriate state fish and wildlife agencies...The exhibit shall include a statement on the nature and extent of applicants' consultation and cooperation with the above agencies.

It is thus essential that fish and wildlife interests make a concerted and organized contribution to this process involving Exhibit S at an early stage in project planning to sensitize the applicant to the importance of instream flow needs and to guarantee coverage of this issue in the application review.

The second point at which fish and wildlife advocates may apply their influence occurs after the Application for License is submitted to the FERC. Upon its receipt, the FERC reviews the application to determine whether or not it fulfills the requirements of the Rules of Practice and Procedure. Public notice of application is then given, specifying a final date for filing protests, notices of intervention or petitions to intervene. Concurrent with this notification copies of the completed application are disseminated to Federal agencies, State agencies and other interested parties for comment and review.

Upon review of the application and determination that instream flow needs are not adequately provided for, an interested party can petition the FERC to intervene in the applicant's licensing. It is essential that such petitions be made before the final date specified by the Commission; otherwise, the petitions may be rejected as "untimely." Section 1.8 of Rules of Practice and Procedure does state that "in extraordinary circumstances for good cause shown, the Commission (may authorize) a late filing." In the event that a petitioner's right to intervene is granted, a hearing is scheduled to resolve the difference. However, prior to the hearing, it often happens that the applicant and the petitioner meet informally and resolve the issue.

Prior to scheduling a hearing, the FERC is also empowered to authorize a Technical Session in which FERC staff meets with the interested party and the applicant in order to clarify the issue, and if possible, resolve it. If resolution is not accomplished in either an informal meeting between the applicant and the intervenor or in the Technical Session, a pre-hearing conference is arranged by the FERC's Office of General Counsel. At this time, the issue is further defined and another attempt is made at resolution. Finally, if the issue is still unresolved, a hearing is scheduled before an Administrative Law Judge of the FERC. Both parties present their case and a decision is made and transmitted to the Commission. This final hearing decision is not binding on the decision of the five-man Commission; however, the decision of the Commission is usually in agreement with hearing findings.

The term of license for most FERC projects is 50 years. The process followed for relicensing of projects is identical to the process discussed previously except that the term of renewal varies from 10 to 50 years and Exhibit S is not required.

In connection with the Forest Service or BLM permit process, the costs associated with this strategy are limited to those incurred during preparation of the fish and wildlife input to the impact survey. The magnitude of the instream flow study and time associated with preparing the report submitted to the permit agency as part of this input would be the principal cost determinants.

For FERC-licensed projects, the costs linked with this strategy are directly dependent on the extent of agreement between the intervenor and the applicant. Expenditures of time and money increase as negotiations advance through the informal meeting stage to the FERC hearing stage. Occasionally, instream flow studies must be performed to provide data for a decision. The studies are authorized at an informal level or as a result of an FERC hearing. The funding for these studies is normally supplied by the utility company applicant. Most likely the studies would be performed by the Departments of Fisheries and Game in cooperation with the staff biologist for the utility company.

III. Illustration

The Merwin Hydroelectric Project (FERC license #935) of the Pacific Power and Light Company (PP&L), of Portland, Oregon, is located 20 miles upstream from the mouth of the Lewis River in Clark County. Washington. The Lewis rises in the Cascades and flows into the Columbia below Woodland, Washington. The stream reach affected by flows from Merwin Dam, the 20 miles between the dam and the river's mouth, is fed also by numerous small tributaries. The Dam and Reservoir are surrounded by the Gifford Pinchot National Forest.

The Merwin is one of three hydroelectric dams owned and operated by PP&L on the Lewis River. It was licensed by the FPC, now FERC, in 1929, with Northwestern Electric Company as its sponsor. Ownership was transferred to PP&L in 1942. The Dam's sole purpose is power production; it has been in operation since 1931. Its 50-year license expires in 1979. In applying this strategy to the Merwin Project, the Department of Fisheries has had to recognize and verify the damage done to a valuable salmonid fishery by the operation of a power facility which produces widely fluctuating stream flows at periods of the year when fish are spawning. The parties involved in this strategy are the Department, PP&L and the FERC. Implementing this strategy has involved the Department of Fisheries, Department of Game, and Pacific Power and Light Company in joint studies and consultations over a period of years to arrive at acceptable fish protective measures for inclusion in the new FERC license. The National Marine

Fisheries Service and the Fish and Wildlife Service are kept informed on program developments and are frequently consulted on the matters pertaining to this undertaking.

Flow information for 5 years prior to construction of the Merwin shows a mean daily flow of 4,538 cfs, with monthly means ranging from 1,075 cfs in August to 6,753 cfs in November. High and low flows of record were 38,400 cfs and 740 cfs, respectively. Since Merwin Dam commenced operation flows have varied, depending on peaking operation of the dam's power facility. A study of 43 years of project operation shows that the mean daily flow was 5,070 cfs after the project was built, and that post-project mean monthly flows ranged from 1,326 cfs in August to 8,369 cfs in December. Post-project high and low flows of record were 84,600 cfs and 266 cfs, respectively,

But mean flow figures do not give an accurate picture of conditions below Merwin Dam. A power facility can produce flows which fluctuate widely in the same day. This kind of fluctuation is detrimental to a salmonid fishery. Since the Lewis River below Merwin Dam supports a fall chinook population, fluctuation in flows should be minimized during certain times of the year to assure the best production possible for this run.

The original license for Merwin Dam contains an "allowable minimum flow" of 760 cfs or the inflow whichever is less. This flow was derived from the historical minimum flows. Hence, there has never been a streamflow provision to provide specifically for fishery needs below Merwin Dam.

No field investigations were conducted by any agency in the 1920's in conjunction with the issuance of FPC (now FERC) license #935; no recommendation for the downstream fishery was offered or accepted in relation to that license. Byrant reports that the earliest studies of the fishery on that stream reach were completed in 1936. These studies showed valuable spawning runs of coho, and good runs of fall chinook and steelhead trout in the tributaries and in the 13-mile reach below the dam.

In recent years the Department of Fisheries studied the impact of peaking flows at Merwin Dam on migrating salmon. Because the river bed below the dam is characterized by numerous gravel bars, reductions from peak flows to the 760 cfs provided by the license stipulation result in the stranding of juvenile salmonids in dewatered troughs and depressions. The reduction of chinook populations may be tied to this fluctuation problem.

Following the fish stranding studies, the Department of Fisheries recommended that minimum discharge at Merwin be increased 3000 cfs and that fluctuations be controlled by reducingflows at a rate of not more than 1000 cfs per hour in not more than 500 cfs increments during the period from April 15 to June 30.

The 1974 recommendations were based upon stranding studies conducted jointly by the Department of Fisheries and Pacific Power and Light. The costs for these studies were absorbed by both the Department of Fisheries and Pacific Power and Light. The costs for these studies were not great. Pacific Power and Light, however, considered that the rate of flow change is the principal cause of stranding. In 1975 as an alternative procedure, Pacific Power and Light proposed and initiated a flow release "plateau operating regime." This regime provided for flow release changes not to exceed 800 cfs. Observations by Department of

Fisheries personnel revealed that changes of 800 cfs per hour were resulting in considerable stranding of salmon fry. The same plateau procedure was planned for 1976, but because of the character of the natural flow conditions, a continuous flow of 3,000 cfs was provided. These flow releases, however were reduced on 22 June, resulting once again in the stranding of salmon fry. The results of the 1975 and 1976 tests were discussed by Pacific Power and Light and the Departments of Fisheries and Game. The agreed to flow which was released in 1977 was a minimum of 800 cfs from 15 April to 30 June with a few minor exceptions. In 1978 Pacific Power and Light provided a minimum flow of 1,500 cfs from March 17 until June 30. Observations by Departments of Fisheries personnel during 1977 and early 1978 indicate a need to begin this flow regime on 15 March. The starting date for 1979 has not yet been agreed to.

The Department of Fisheries indicates that in 1978 and 1979 it will conduct flow studies for spawning potential of chinook salmon in order to formulate flow recommendations for the remainder of the year. The Department of Fisheries indicates that it will seek funding from Pacific Power and Light for these studies.

The Department of Fisheries and Pacific Power and Light will attempt to enter into an agreement concerning flow regimes which will be incorporated into the new Merwin license. If agreement cannot be reached, the matter will be arbitrated by the FERC and the resulting decision stipulated in the license.

As recently as 1976 PP&L officials have maintained that this license stipulation has been adhered to over the years. However, USGS daily discharge tables for a 43-year period show that violations have occured with some frequency, especially in the months of July, August, and September. However, frequency of violations has steadily decreased since 1946, when the present licensee assumed operation of the dam.

Success in the application of this strategy to Merwin Dam appears possible. Pacific Power and Light and the Department of Fisheries and Game believe that the regulation of flows at Merwin Dam and not the minimum flow itself is important to the fish population downstream from Merwin Dam.

IV. Evaluation

The Merwin Project illustrates that this strategy has some potential for success in Washington as applied to FERC projects, since the State's waterways have so many large power projects. However, since this strategy is comparatively new in Washington, it is too early to predict its utility.

The Merwin Project is the Department's first attempt to influence the operation of a power project through license stipulations; formerly the Department has attempted to work through "gentlemen's agreements" with the power companies. The Department believes that FERC officials are not particularly open to this strategy at this time.

One constraint on the strategy's effectiveness is the need for specific flow studies. Applicants are understandably wary of accepting instream flow recommendations based on cursory stream investigations, especially when the guarantee of such flows would increase project costs. Although the licensing or permit processes contain requirements for consideration of instream flow needs, the inability of the interested party to develop realistic recommendations may result in either an omission of instream flow stipulations, as was true of the original license for the Merwin Project, or inclusion of a clause merely guaranteeing "adequate" or "suitable" flows, a clause which is difficult to enforce. In the case of the license renewal for the Merwin Project, input from resource agencies is being made an integral part of the renewal process, and Department of Fisheries recommendations for increasing flows and decreasing fluctuation are sufficiently specific to be enforceable.

Although there is some cost to the State resource agency for participating in flow studies, the brunt of that cost is borne by the power company; hence cost is not a major constraint.

More serious constraints are the length of time and the amount of compromise involved in achieving a suitable agreement with the applicant with or without the use of the intervention process, and the difficulty of monitoring releases to make sure stipulations are being adhered to. In the case of the Merwin Project, adherence to the old stipulations was not 100%, though PP&L's track record in that regard has steadily improved since 1946. It remains to be seen whether strict compliance with a larger minimum flow requirement and a more complicated operating procedure will be forthcoming.

The Merwin Project also illustrates another facet of this strategy. Often a project sponsor will agree to supply minimum flows on an informal, non-contractual basis. Such "gentlemen's agreements" have sometimes been responsible for maintaining fisheries below reservoir projects; however, more often than not, the absence of a compelling legal force guaranteeing minimum reservoir releases results in the sponsor's withholding of flows during critical periods of competitive user needs. If the license or permit stipulates flow releases, the licensee or permittee are legally obligated to provide them. Most other instream flow strategies do not lead to as strong a legal obligation.

The future utilization of this strategy will undoubtedly be enhanced as a result of the current research on instream flow needs. Also, further consideration may be given to instream flows in FS and BLM projects with the implementation of the Federal Land Policy and Management Act of 1976 (P.L. 94-579).

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STATE ALLOCATION OF RESERVOIR SPACE

The strategy to obtain reservoir space for fisheries in reservoirs constructed or licensed under State law is not available in Washington because no statutory or institutional basis exists for its implementation.

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STATE PURCHASE AND LEASE OF WATER RIGHTS

I. Identification

Contractual arrangements to reserve instream flows include the direct purchase of flow rights, the leasing of rights, and the purchase of shares in a mutual water company. The legal basis of this strategy lies in the provisions of Rev. Code. Wash. § 77.12.200 which explicitly empowers the Washington Department of Game to either purchase or lease water rights and implicitly purchase shares in a mutual water company for conservation pools in order to sustain minimum flows where necessary. It appears that this strategy, also, is available to the Washington Department of Fisheries. Revised Code of Washington §§ 75.20.020 and 75.20.050 provides for the purchase and lease of water rights on the Columbia River and its tributaries, and Revised Code of Washington § 75.80.30 empowers the Department of Fisheries to purchase property rights, which may be construed as extending to the purchase and lease of reservoir storage rights.

II. Application

Instream flow rights could be purchased by a private party, by the Washington State Department of Game, or by the Washington State Department of Fisheries. However, in Washington, most rights are still appurtenant to land, because riparian rights and appropriative rights coexist under the Washington system. Since Fisheries and Game are unlikely to purchase land, they are unlikely to acquire water rights in this manner. Purchase of water rights separate from land is possible under Washington law if there is a diversion, for example, a dam. Whether such a purchase for instream flow use could be legally protected is still a question under Washington law. It is likely that junior rights holders might appropriate the water and then argue that on an equity basis the instream flow rights should be allocated to them. For this reason the Department of Fisheries and Game have no current programs to purchase water rights.

Departments of Fisheries and Game can also lease water but have no program to do so. This approach provides only an interim solution but may be applied to protect a valuable fishery in a particular stream where no permanent supply of flows is available for purchase.

The technique of purchasing shares in a mutual water company is probably more applicable to private parties than to the Departments of Fisheries and Game or any other state agency. A mutual water company is a corporation usually organized by landowners to acquire water for domestic and agricultural use in a designated area. Each shareholder receives a pro rata amount of water based upon the number of shares owned in the company. To apply this strategy, a private party, conservation organization or state agency would acquire water rights through a purchase of shares in a mutual company and then not divert their entitled water, leaving it for instream use.

The major cost of implementing this strategy is, of course, the high price of water rights which has risen dramatically in the last few years and will probably continue to rise in the future. However, the acquired water rights might be sold to be exercised at a point downstream where few instream values worth preserving exist, thereby defraying part of the acquisition cost. Other costs include expenditures of personnel and funds for studies to identify streams where a purchase would have the greatest benefit and the substantial effort to negotiate for the purpose.

III. Illustration

Because there is no illustration of this strategy in Washington, an example from Colorado will be discussed.

In 1977 the Colorado Division of Wildlife purchased 1 cfs in Boulder Creek above the City of Boulder. It purchased this flow from a private owner for $18,000. The seller was located with the aid of The Nature Conservancy and the Colorado Attorney General's Office.

Although 1 cfs seems to be a small amount of water, this purchase is crucial to preserve the valuable trout fishery in Boulder Creek. The water right purchased is also quite senior, pointing out one of the prime benefits available with this strategy. The importance of this 1-cfs purchase was realized by the Colorado Division of Wildlife while they were studying Boulder Creek as part of their program to implement Senate Bill 97.

IV. Evaluation

Contractual arrangements for the enhancement of instream flows have not been used in Washington in the past, and sources from the Departments of Game and Ecology are pessimistic about future application of the strategy. Department of Fisheries personnel, however, indicates that this may be a promising strategy and it merits further consideration. Cost is seen as a major constraint, although if the water could be resold downstream the acquisition cost could be reduced. The other major argument against the strategy is the existence of Washington's instream flow laws, Rev. Code. Wash. § 90.22 and § 90.54. The argument is as follows: Since the legislature has provided a mechanism for obtaining instream flows for fisheries and wildlife, it does not behoove these agencies to obtain them in other ways. Department of Game and Ecology officials believe that obtaining base flows under Rev. Code Wash. § 90.54 results in better resource management.

When no flow rights are available for sale, then the Departments of Fisheries and Game are authorized to lease water for instream use. In addition to the constraints outlined for direct purchase, leasing arrangements incur the following constraints:

- Leasing presents only an interim solution
- Leases may be subject to conditions which are expedient for the vested claimant rather than the lessee.

When no private rights are available either for leasing or purchase, then a purchase of shares in a mutual water company may be advantageous. This purchase probably would have to be made by a private individual or organization. Besides the cost constraint, other problems would arise in applying this approach. First, there is some question as to whether a mutual water company's shares can be used for instream purposes. Second, such a use would probably meet intense hostility from diversionary users.

Despite the constraints upon the strategy of employing contractual arrangements to enhance instream flows, this strategy might be investigated for application in Washington. It provides a very direct way to legally protect instream flows. Also, it provides an opportunity to acquire senior water rights, an increasingly important factor in a state where many streams are fully or overly appropriated.

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WATER RESOURCE PLANNING

FEDERAL WATER RESOURCES COUNCIL PLANNING PROGRAMS

I. Identification

Coordination of Water Resources Council (WRC) planning activities performed by a River Basin Commission (RBC) with the planning activities of the member states of the Commission will allow for increased emphasis on instream flow needs on national, regional and state levels. The planning process of the WRC derives from the Water Resources Planning Act of 1965 (Public Law 89-80), which was designed to encourage conservation, development, and use of the nation's water and related land resources on a comprehensive and coordinated basis by Federal, state, and local governments and private enterprise. The Act established the Water Resources Council (Title I), provided for the establishment of River Basin Commissions (Title II), and authorized financial assistance to states for comprehensive water and related land resources planning (Title III). So-called Level B studies were authorized by Section 209 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). Under this legislation, the WRC was directed to prepare Level B Plans for all river basins of the United States.

II. Application

Level B studies are designed to resolve complex problems requiring interdisciplinary approaches and interagency inputs. These studies vary widely in scope and detail, focus on middle-term needs (15-25 years), and involve Federal, state and local interests. The findings of these studies are an integral part of the "Comprehensive, Coordinated, Joint Plans" (CCJP's) prepared by the various RBC's. The subject matter of these studies includes energy issues, water quality, land use and other water-related topics such as maintaining instream flows for fish and wildlife.

A CCJP, when approved by a River Basin Commission, is forwarded to the Water Resources Council for review and transmittal to the President. He reviews it in turn and transmits it to Congress with his recommendations of the Federal elements of the plan. The CCJP will also be used to guide water and related land resources development at the state level. Just as the RBC is responsible for preparing a CCJP at the regional level, so too are many states responsible for preparing or revising Comprehensive State Water Plans governing future water policy decisions. In Washington this planning function is performed by the Department of Ecology under its Water Resources Management Programs. As was pointed out in the strategy entitled"State Appropriation of Instream Flows",these plans include, for the river basin in question, base flows for the instream flow needs of the fish and wildlife of the basin. The State statutory basis for the formulation of Water Resources Management Programs is the Water Resources Act of 1971 Rev. Code Wash. § 90.54, which directs the Department of Ecology to formulate management and use programs for the waters of the State. Though state participation in Level B planning is small in comparison to its state water use planning efforts, there is some overlap between state plans and Level B plans. Thus Level B plans and State plans address common topics, such as instream flow needs.

A major cost associated with the use of this strategy results from state participation in a Level B planning effort. According to WRC requirements, a state must assume 25% of the total funding cost. Fortunately, the state's share in this cost need not be monetary but may be supplied in the form of in-kind services, such as office space and equipment or project support staff. In addition, costs are incurred by participating agencies in the planning process who fund state fish and game agencies to determine instream flow requirements. The level of Federal funding received by the state fish and game agency is based upon negotiations between the fish and game agency, the FWS, and the River Basin Commission.

III. Illustration

The Okanogan River Basin Level B Study Report of the water and related land resources was prepared by the Washington State Study team for the Pacific Northwest River Basin Commission in April, 1977. The report has since been revised and will be reprinted in the near future. The study team consisted of representatives from the following State and Federal agencies: the State Departments of Ecology, Social and Health Services and Game; the Department of Agriculture's Soil Conservation Service, Forest Service, and Economic Research Service; the Department of Interior's Bureau of Reclamation, FWS, HCRS, National Park Service, and the Bonneville Power Administration; and the Army Corps of Engineers. A local citizen's committee was also an active part of the study team; it participated as well in the State Water Resources Management Program planning for the basin. The Pacific Northwest River Basin's Commission coordinated the study at the request of the State of Washington. The study, one of four Level B studies completed on Washington River basins, is a contribution to the Comprehensive Coordinated Joint Plan for the Pacific Northwest scheduled for completion in 1977. The Okanogan Level B study identified recommended projects and programs to be initiated by local, State, and Federal agencies within 15 to 25 years. It provides a preliminary analysis and determines whether a given project or program warrants more detailed study. The Level B study identifies priorities of recommendations which will affect the establishment of priorities at State and regional levels when the CCSP is prepared.

Water supply in the Okanogan Basin is limited, especially during the late summer. The four competitors for remaining supplies are the Colville Confederated tribes (the Southern Half of the Basin contains the Colville Indian Reservation), agriculture (the economy of the Basin depends largely on apple orchards and cattle), fisheries (critically low at present), and recreation (on the increase in the Basin). The Indian tribes base their claim on prior right, and the State recognizes this right. However, since future needs of the reservation have not yet been quantified, the amounts of water available for other uses are difficult to determine. Related water use issues of this Basin are international considerations, since most of the water flows from Canada, flooding, and water quality.

The study develops four alternative plans: one continuing the status quo, one emphasizing economic development, one emphasizing environmental quality, and a recommended plan which combines elements of the latter two. The recommended plan includes a comprehensive study of the Okanogan/Similkameen basins to determine future development and apportion supplies between the United States and Canada; it suggests issuing water rights to non-Indians on a case-by-case basis with provisions of possible prior Indian rights pending determination of future tribal needs. It makes specific recommendations for rehabilitation of the basin's two major irrigation systems. Regarding fish and wildlife needs, it refers to the State Department of Ecology's base flow provisions and recommends, in addition, that fish and wildlife agencies study the effect and practicality of the purchase of existing rights (see strategy entitled State Purchase and Lease of Water Rights).

Other recommendations are for all local, State, and Federal resource agencies to work with private landowners through cooperative management programs to restore, enhance, and preserve fish and wildlife habitat; to give fish and wildlife equal consideration in State and Federally funded water resource development; to develop local land use regulations to protect habitat and provide incentive to private landowners to protect and enhance habitat; to amend the State open space law to provide increased incentives to landowners and to enable State agencies to purchase development rights and to control land development which would be incompatible with fish and wildlife; research and development of methodology to enhance fish and wildlife, basic data collection programs, and public information programs are also recommended. The Okanogan Level B study is presently in the statutory review stage, however statutory comments have not yet been printed.

IV. Evaluation

The WRC was established in 1965. Since that time, States have benefited from funding received under Title III of the Water Resources Planning Act. In recent years, RBC planning efforts such as Level B studies have begun to take increased notice of instream flow needs. Continued funding availability under Title III and increased concern for instream flows in Level B studies have combined to enhance the consideration of instream flow requirements in regional and State planning programs.

Level B studies have been completed in four basins in Eastern Washington: the Okanogan, the Methow, the Big Bend, and the Yakima Basins. The next step is the review process; whether the studies will be implemented at least as to their Federal aspects depends on the decisions of the Water Resources Council, the President, and the Congress.

A source in the State of Washington Department of Ecology points out that though the studies stop short of making specific recommendations of minimum instream flows, they do address the process of establishing such flows by incorporating State procedures and as such are a step in the right direction. Specific flows have not been recommended for the East Washington basins for two reasons. First, these studies have been completed more-or-less concurrently with the development of State Basin Management Plans for these basins, and the State plans deal with specific base flow determinations; second, such specificity is beyond the scope of a Level B study; level of detail achieved in the State plans is equal to what would be a Level C study in Water Resource Council terms.

Because the Level B study is on a more general level and because the State plans contain, at least in the opinion of the State Department of Ecology, good levels of base flows, it might be said that the Level B study will have little or no effect. But State sources believe that there is a definite advantage to having the two, dove-tailed plans, Level B and State, because this combination will enable Level C planners to have more planning resources available, since the Federally sponsored study involves a larger number and a broader spectrum of agencies than does the State plan.

This strategy provides a means for the study of instream flow needs rather than a formal method of reserving these flows as part of dam and reservoir project operations. Therefore, it must be used in conjunction with other strategies which can directly achieve flow reservations. Nevertheless, the national and regional exposure accorded to flow requirements as part of the WRC planning program increases the overall viability of instream flow reservations.

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FEDERAL AID FUNDING TO PURCHASE STORAGE

I. Identification

The Federal Aid in Fish and Wildlife Restoration Programs are supported by a manufacturer's excise tax on certain items of fishing gear, sporting arms and ammunition. These taxes collected by the United States Treasurer are appropriated to the Fish and Wildlife Service which distributes these monies to the states and territories for carrying out the intent of the Federal Aid Programs. Under the Federal Aid in Sport Fish Restoration Act (P.L. 81-681), known as the Dingell-Johnson Act, funds may be appropriated to the states for the purchase of reservoir storage which, ultimately, could be used as a means of reserving instream flows. Other legislation, which combined with the Dingell-Johnson Act, forms the legal basis for Federal Aid Programs, includes the Federal Aid in Wildlife Restoration Act, known as the Pitman-Robertson Act (P.L. 75-415), and the Anadromous Fish Conservation Act (P.L. 89-304).

II. Application

This strategy may be utilized when the Washington Departments of Fisheries and Game determines that the fish and wildlife resources below a reservoir might not be preserved or enhanced except by the purchase of reservoir storage. The Department of Fisheries recently became eligible for receipt of Federal Aid Funding as it now issues licenses for salmon sport fishing. Parties participating in the implementation of this strategy would be the interested state fish and game agency and the regional FWS Federal Aid Office.

The process whereby a state applies for Federal Aid funding is described in the 1973 revision of the Federal Aid Manual. The first document submitted by the state is the Application for Federal Assistance (AFA), which outlines the basic plan for the proposed project. Information pertinent to the environmental and socio-economic impacts of the project as well as budget information and forecasted cash needs are also included in this application. The most important part of the application is the Program Narrative which must address:

- Needs or objectives of the project
- Expected benefits or results
- Approach of the project
- Project location
- Related Federal projects.

The AFA in combination with any supporting documents provides the basis for any decision made by the Federal Aid office. If the proposed project is in accordance with specifications of the Federal Aid Program, a Project Agreement is issued. The Project Agreement outlines the period of agreement between the state and the U.S. Government and the respective cost share of each entity during the period of development. Care must be taken that matching funds come from state sources; a project cannot be approved if it depends upon another Federal program for its matching funds.

Costs are incurred by the state and Federal governments in the implementation of this strategy. Prior to submitting an AFA, the state must expend funds to determine which streams are in need of increased flows. Additional costs are borne by the state in revising AFA's which the Federal Aid office determines to be incomplete or insufficiently detailed.

III. Illustration

Federal Aid monies have not yet been used in Washington to purchase reservoir storage for instream flows, so an example from Utah is cited here to illustrate the utility of this strategy. Long Park Reservoir Project, operated by the Sheep Creek Irrigation Company, will be located on Sheep Creek in the Ashley National Forest within Dagget County, Utah. Sheep Creek is a feeder of Flaming Gorge Reservoir operated by the Bureau of Reclamation. A clearing permit was secured from the Forest Service and elimination of trees from the reservoir site was completed in the spring of 1977. Construction of the reservoir began in October 1977 with an estimated completion date of October 1978. At the present time, the Sheep Creek Irrigation Company acquires water from four high-mountain impoundments--Daggett, Tamarack, Jesson and Spirit Creek between the site of the proposed Long Park Reservoir and the backwater of Flaming Gorge Reservoir.

In its upper and middle reaches, Sheep Creek is a narrow stream located in a constricted canyon. In its lowermost three miles, Sheep Creek Canyon expands in its course toward Flaming Gorge Reservoir. This reach sustains the spawning of rainbow and brown trout which emerge from the reservoir in the months of April (rainbow) and October and November (brown). In past years, to secure adequate storage for irrigation needs, the operating schedules of the four high-mountain reservoirs stipulated that flows would not be passed in Sheep Creek during the months of spring run-off storage or during the fall non-irrigation months. Therefore, the spawning of rainbow and brown trout was hindered in the lower 3 to 4 miles of Sheep Creek.

In 1974, the Utah Division of Wildlife Resources (DWR) was notifed that planning had been undertaken by the Sheep Creek Irrigation Division and the Soil Conservation Service for the proposed 13,700 acre-foot Long Park Reservoir. On June 14, 1976, the DWR submitted an AFA to the Fish and Wildlife Service. In the Narrative Statement of this application, the DWR made the following proposals:

- Purchase three of the four high-mountain lakes from the irrigation company so that these impoundments could be stabilized
- Purchase a 3,000 acre-foot conservation pool to maintain a trout fishery in the new reservoir
- Purchase 720 acre-feet of water which could be bypassed at the Long Park Reservoir Diversion Dam to enhance the fishery habitat in the lower four miles of Sheep Creek.

According to the agreement between Sheep Creek Irrigation Company and the Division of Wildlife Resources, no water will be diverted from Sheep Creek between December 1 and March 31; however, from the 720 acre-feet of active storage acquired, 4 cfs will be bypassed each spring from the Lower Sheep Creek Diversion Dam for the first 30 days after water from Sheep Creek is diverted to Long Park Reservoir, and 4 cfs will bypass this diversion dam between October 1 and December 1. These releases are intended to enhance the spawning habitat of Lower Sheep

Creek. The DWR has also reported that, if these flows result in improved spawning, channel improvement and riparian revegetation will be carried out in this reach.

On June 30, 1976, the FWS issued a Project Agreement wherein funding in the amount of 75% of project costs or $272,790 was supplied to the DWR for the Long Park Reservoir Project. These funds were to be administered in accordance with the Federal Aid in Sport Fish Restoration Act and used for the purchase of water rights in the three high-mountain lakes and Long Park Reservoir and to provide for bypass flows at the diversion to Long Park Reservoir.

As indicated by the two-week "turn-around" time between DWR's submission of the AFA and the issuance of an FWS Project Agreement, an AFA thoroughly prepared in accordance with Federal Aid Manual instructions will ensure timely processing of an application. The critical points in the decision-making process for this strategy are to be found during the State's preparation of the AFA. The successful acquisition of Federal Aid funding is dependent upon:

- Sufficient documentation of the AFA for the proposed project
- Adequate performance in Federal Aid-funded projects which are in progress.

In the case of Long Park Reservoir, the major cost incurred by the State was the 25% share ($90,930) of project costs.

IV. Evaluation

This strategy has not been implemented in Washington and the Departments of Fisheries and Game indicate that competition for available reservoir storage results in water costs too great to justify the necessary expenditure of funds. These agencies prefer to utilize less costly strategies.

However, if Washington changes its present position it must avoid mistakes other states have made which have curtailed its effectiveness. Conversations with officials of the Federal Aid Program indicate that, in the past, delays in project funding have resulted from inadequate documentation of Project Agreements. These agreements between the state and the affected irrigation districts were often vague in delineating post-project responsibilities. Failure by the state to submit reports and vouchers for the previous year's work within the 90-day period specified by Federal Management Circular 74-7 also delayed the processing of an AFA for impending work.

Another impediment to the use of the strategy has been state violation of the Rules and Regulations of the Federal Aid Program (Section 80.5). States become ineligible for Federal Aid funding if funds or real property acquired through this source pass from control of the state fish and game agency or are used for purposes not specified in the Project Agreement. State eligibility is restored when misused funding is compensated or the appropriated property or an equivalent is restored. Adherence to the administrative guidelines of the Federal Aid Programs will improve this strategy's effectiveness.

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FEDERAL RESERVOIR CONSTRUCTION AND ENLARGEMENT

I. Identification

This strategy involves the construction of new dams and reservoirs large enough in capacity to expressly provide for instream flow reservations, or the enlargement of existing dams and reservoirs for this purpose. The legal basis for this strategy is implied in the legislation granting authority to construction agencies to construct and modify reservoir projects. The Bureau of Reclamation derives this power from the Reclamation Act of 1902 and subsequent amendments, especially the important 1939 amendments. The Corps of Engineers is granted construction authority by the various Rivers and Harbors Acts, and the Soil Conservation Service operates under the Small Watershed Protection Act. More specific statutory authority to provide reservoir storage capacity expressly for regulation of streamflow for fish and wildlife needs is contained in Section 102 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500).

The Anadromous Fish Conservation Act authorizes the Bureau, Corps, Department of Agriculture, and the states to construct dams and reservoirs solely for the purpose of conserving, protecting, and enhancing anadromous fish if the Secretary of Interior deems this action necessary. The Fish and Wildlife Coordination Act provides a mechanism through which the Fish and Wildlife Service and state fish and game agencies can implement this strategy.

II. Application

This strategy would be applied when construction agencies first begin planning to construct a new dam or enlarge an existing one. No Federal construction agency, except under the Anadromous Fish Conservation Act, is authorized to build a reservoir solely for fish and wildlife purposes; however, the protection or enhancement of fish and wildlife resources could be made a very important project purpose in a multi-purpose project. The FWS and Washington Departments of Fisheries and Game could promote fish and wildlife conservation to the extent that additional storage capacity specifically to sustain and reserve minimum instream flows would be planned. If during initial project planning these agencies learn that planned storage volumes will be insufficient to provide adequate instream flows, they may recommend a larger dam and reservoir and have the additional costs allocated to fish and wildlife benefits.

When construction agencies enlarge existing reservoir projects, they may do so solely for fish and wildlife purposes or for a number of reasons including the preservation or development of fish and wildlife resources. The fish and game agencies would have to convince the construction agencies of the advisability of enlarging a reservoir to ensure reserving instream flows. Relating a minimum flow regime to the storage capacity necessary to its maintenance may require hydrological data and expertise that is difficult for fish and game interests to acquire. Also, fish and wildlife agencies must convince the construction agencies of the economic benefits of this action. The construction agencies are an important beneficiary of this strategy because they can claim valuable economic benefits in constructing larger dams or enlarging dams for fish and wildlife purposes, possibly improving the economic justification of a reservoir project. Marshalling public opinion can be an important component of this strategy. The FWS and the Departments of Fisheries and Game can cooperate with conservation organizations and sportsmen's clubs in their negotiations with the construction agencies.

In implementing this strategy, the fish and game agencies must decide which proposed or existing reservoir projects they should investigate for which instream flow and related storage recommendations are most needed. This decision is predicated on the importance of protecting a particular ecological resource and the likelihood that construction agencies will accept and implement the recommendations. The decision making involved is very related to the application of other instream flow strategies (see strategies entitled State-Federal Flow Requests Made Early, State-Federal Combined Storage and Flow Requests, and State-Federal Interagency Consultations). The implementation of this strategy also depends on decision making by Congress which must authorize the construction or enlargement of dams and reservoirs.

The total costs could be substantial in implementing this strategy. Costs would be incurred as always in conducting stream investigations to justify the inclusion of flow reservations. In addition, however, developing the hydrological basis for increasing the reservoir capacity to sustain the flow reservation will impose significant study cost.

III. Illustration

The proposed enlargement of Bumping Lake, a reservoir located on the Yakima River, Washington, provides an illustration of this strategy. The Yakima River had supported a major run of salmon, but with the impoundment of the river during the 1930's, this run was all but destroyed. The enlargement of Bumping Lake was planned to rehabilitate the salmon run.

Consideration has been given to enlarging Bumping Lake since 1939 when the Roza Diversion was completed. Originally, the planned enlargement was primarily for increased irrigation storage, but enlarging the lake for this purpose could not be justified economically and, therefore, economic benefits had to be derived elsewhere. A complication was that in the mid-1950's the local irrigators were not enthusiastic over the proposed enlargement because they believed the stored water would be too expensive. For these reasons, the BR decided to allocate substantial storage to other purposes. Influenced by the FWS and the recent passage (in 1958) of the Fish and Wildlife Coordination Act, the Bureau proposed a 458,000 acre-foot reservoir with 324,000 acre-feet allocated to fishery enhancement and only 100,000 acre-feet for irrigation. The Washington Department of Game and the BR are presently negotiating over an optimum storage release schedule to provide for the instream flow needs of salmon.

The decision making involved in implementing this course of action centers around the FWS decision to encourage the BR to enlarge the reservoir for fishery enhancement and the BR's favorable decision largely due to the added economic benefits it could claim to help justify the action. The costs, so far, have been those generally incurred in planning a project modification and have not been substantial. Greater costs may accrue, though, due to delay in construction caused by local opposition. Additional time may be spent in pacifying opposition and in the Congressional authorization process.

Irrigators along the Yakima River oppose allocating a large amount of storage for instream use, and threaten to divert fishery enhancement flows. To guard against this possibility, the Washington Department of Game has suggested that streamflow gauges be installed along the river and irrigators be contractually bound to compensate losses to the ecosystem caused by illegal diversion.

IV. Evaluation

Generally, the FWS Area Office (Olympia) cannot be expected to support implementation of this strategy. Enlargement of reservoirs will inundate wildlife winter feeding grounds, a trade-off the FWS is reluctant to accept. Enlargement of reservoirs, also, block tributaries leading into the reservoir adversely affecting the stream fisheries. The FWS Area Office (Olympia) considers the Bumping Lake case to be a unique situation, because other benefits were recognized in addition to fishery benefits. Furthermore, Bumping Lake is situated in a heavily forested area, offering ample winter feeding grounds for large game.

To the present, no reservoir west of the Mississippi River has been built solely for fishery purposes under the Anadromous Fish Conservation Act. Federal construction agencies, though, can include fish and wildlife conservation as a project purpose and can provide substantial reservoir storage to sustain flow releases so as to further this purpose. This approach has been more common in recent years, partially because the construction agencies can maximize their benefit claims by adding to the project purposes, and because of recent environment legislation and increased environmental consciousness.

To successfully implement this strategy, the FWS and Washington Departments of Game and Fisheries must participate early in the planning process with the construction agency and fully understand the allocation of projected reservoir storage. A basis for coordination with construction agencies is provided by the Fish and Wildlife Coordination Act (see strategies entitled State-Federal Combined Storage and Flow Requests, State-Federal Flow Requests Made Early, and State-Federal Interagency Consultations). Although the construction agencies are under no legal or institutional compulsion to adopt the course of action advocated by the fish and game interests, conservation agencies and their private-sector allies are sometimes convincing in bargaining for greater reservoir storage capacity to ensure reserving instream flows. Their persuasiveness depends a good deal on the scope of their knowledge of the hydrological and biological conditions surrounding a planned or existing dam and reservoir project.

Once a construction agency commits itself to build a new dam or enlarge an existing one for purposes including the reservation of instream flows, such a commitment is embodied in authorizing legislation passed by Congress. This legislative action is a primary advantage of this strategy because it has the force of law and expresses Congressional intent to protect instream flows.

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WATER RESOURCE MANAGEMENT

STATE WATER RIGHTS RECORDS ANALYZED

I. Identification

This strategy involves locating and analyzing the water rights records for a particular stream as part of the process for securing instream flows. The strategy itself will not ensure an instream flow, but it can be used by the Fish and Wildlife Service and by the Washington State Departments of Game and Fisheries in formulating tactics when negotiating with construction or operating agencies for minimum instream flows. Any interested party could find this strategy useful in deciding what tactics or further strategy would be appropriate to obtain instream flows in a particular stream.

The distribution and administration of water rights in Washington is the responsibility of the Department of Ecology, created in 1970 by legislative act. This act, together with the 1971 Water Code, as amended, and two recent acts prescribing State water policy, the Water Resources Act of 1971 (Rev. Cod Wash. § 90.54), and the State Enviornmental Policy Act of 1971 (Rev. Code Wash. §43.21) are the legal basis for this strategy on the State level. Negotiations between the FWS and the Departments of Game and Fisheries and the Federal construction agencies take place in accordance with the Fish and Wildlife Coordination Act. These statutes are the legal basis of this strategy.

II. Application

The Washington State Departments of Game and Fisheries, the FWS, or any conservation organization can employ this strategy. It is applicable primarily when a concerned party seeks to influence the Department of Ecology to reserve minimum instream flows in its Basin Management Plans; when a concerned party seeks to influence the Department of Ecology to deny or limit a use permit where such a plan is not yet in effect; and when a State agency or the FWS is bargaining with a Federal construction or operating agency for reservoir releases sufficient to maintain prescribed minimum flows.

Knowledge of the water rights established along a stream reach will aid in selecting the best course of action to reserve instream flows there. For example, if normal streamflows are fully appropriated, a strategy such as filing a junior water right would not be effective, but a strategy such as direct purchase of water rights would be. In contrast, if a stream is not entirely appropriated, an administrative appropriation of instream flow may be applicable.

The Departments of Game and Fisheries or the FWS can bargain more intelligently with the construction or operating agency for prescribed releases from a reservoir if the extent, location and ownership of water rights established below the dam are known. For instance, if the fishery in a certain stream reach required a minimum 15 cfs instream flow, then sufficient reservoir releases should be prescribed so that 15 cfs will remain after all water rights throughout the stream reach have been exercised. Therefore, knowledge of the existing water rights is essential. With this knowledge, a fish and game agency could tie an instream flow recommendation to an existing downstream water right. This bargaining tactic may be useful as a last resort toward reserving an instream flow where protection of fish and wildlife is not recognized legally as a beneficial use of water.

Water rights are a matter of public record in Washington. These records are readily accessible, but because some water rights claims have not been adjudicated and others may have been relinquished by non-use, it may not be possible to ascertain a given water right's validity by the records alone. The Department of Ecology has placed all water rights permits recorded from 1917 to the present in a computer; these records can be retrieved by Water Resources Inventory Area, by township, or by county. Also recorded are certificates issued as a result of water rights adjudication proceedings. In addition about 165,000 claims to water rights not of record by certificate or permit have been computerized and can be retrieved by the same geographical areas.

The Washington State Department of Game has its own micro-file of water rights for each of the three geographical designations: Water Resources Inventory Area, township, and county. The Department also consults Department of Ecology records as needed. In addition, the Department keeps its own records of water rights applications which have been protested by the Department in the past. This enables the Department to use these earlier protested or provisioned applications as precedents in requesting denial or provision of current applications when they are presented to the Department as part of the normal review process (see chapter entitled State Discretionary Water Permit Authority).

Regarding water permits issued by the Department of Ecology and water certificates issued as a result of Statutory adjudication proceedings there is no difficulty. Where unadjudicated claims are concerned, there may be some difficulty establishing whether a given right is valid. In 1969, Washington adopted a Water Rights Claims Registration Act which requires water users whose rights are not based on permits issued by the permit-issuing agency or certificates resulting from the adjudication of water rights to file their claim with the Department of Ecology. These claims are prima facie evidence of a water right in subsequent statutory adjudication proceedings.

Prior to 1917, disputes regarding water rights were adjudicated in the local courts; however, the 1917 Water Code (Rev. Code Wash. § 90.03) prescribed a State adjudication process involving the courts and all the water users in the basin as well as the disputants. This process is slow; to date only about 10% of the geographical area of the State has been adjudicated. The Department of Ecology makes a "best estimate" assessment of the validity of these claims in setting its Basin Management Plans; it has recommended legislative adoption of a more streamlined adjudication process administered by the Department of Ecology and is presently seeking funds to be used to accelerate the adjudication process.

Despite these problems, use of the State water records can help interested parties, including the State Departments of Game and Fisheries and the FWS to ascertain amount, point of diversion, and date of priority of each water right. The cost of obtaining water rights records is nominal.

III. Illustration

The denial of the application of Melvin E. Pitts, Port Orchard, Washington, illustrates the successful application of this strategy by the Washington State Department of Game. The application proposed to appropriate water for a continuous domestic water supply from an unnamed stream tributary to Salmonberry Creek for the irrigation of a tract of one and one-half acres located in Colby Garden Tracts. Analysis of the application itself provided some of the grounds for requesting denial: the legal description appearing on the application described approximately 3 acres of land; the attached map showed that the residence involved in the application was not located on that tract. Since "domestic supply" according to current standard Department of Ecology operating procedures, means normal use within a residence and normal maintenance of grounds not to exceed one-half acre and associated with a residence, the application did not qualify. Other grounds for denial were provided by a field inspection of the site by a Department of Ecology examiner, which showed that the ground was cleared for irrigation, that the residence was not located on the property described as the place of use, and that an old diverison system existed and was apparently being used for irrigation of acreage in excess of that normally associated with domestic needs. A check of Department of Ecology Records showed the stream system in question had been closed to irrigation by request of the Departments of Fisheries and Game since 1948 and that the applicant had been notified of that fact prior to submission of the application for domestic use.

Correspondence between the Department of Game and the Department of Fisheries further revealed that Salmonberry Creek was populated with coho salmon the year round, that their numbers were limited by low flows and that further reduction in flow would reduce the population. The Department of Fisheries observed that the stream was closed to consumptive diversion in 1948 and asked that the application be denied. The Department of Game joined in this recommendation. The fish and wildlife agencies incurred some expense in reviewing the application and file information to formulate their protest.

The Department of Ecology denied the permit, observing that an alternate source was available and that to issue a permit in degradation of established standards merely because the water was already being used would encourage noncompliance with the water code.

IV. Evaluation

As illustrated by the above example, knowledge of water rights already in existence has proved a useful tool in Washington when used to influence the water permit authority to limit or deny the issuance of additional water rights on streams already fully appropriated or nearing that stage. The strategy has not often been applied, however, in establishing agreements with Federal construction agencies for minimum releases for reservoirs for instream flow use.

Since Washington law does recognize instream flow for fish and wildlife as a beneficial use of water, use of the bargaining tactic of tying instream flow requests to downstream water rights is perhaps less necessary there than elsewhere. Nevertheless, this tactic might be a useful way to "insure" base flow programs.

This strategy is, of course, ineffective used by itself. A knowledge of the water rights situation along a certain stream will not result in an instream flow reservation unless this knowledge is used in conjunction with another strategy.

An advantage of this strategy in Washington, compared to some other states, is the accessibility and comprehensiveness of water rights. Another advantage is the fact that the use of this strategy is not limited to a particular agency or organization; it can be applied by a concerned party to every stream in Washington at a nominal cost.

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STATE-FEDERAL FLOW REQUESTS MADE EARLY

I. Identification

To offer timely flow recommendations, the Fish and Wildlife Service and the Washington State Departments of Game and Fisheries must be involved in the planning process when Federal agencies, such as the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service, plan the construction of dams and reservoirs. Recommendations that are timely, i.e., made prior to project construction, have a greater chance of acceptance and implementation than those made during or after construction. The legal basis of this strategy is the Fish and Wildlife Coordination Act of 1958 and the planning procedures adopted by the Federal construction agencies.

II. Application

This strategy is applicable when any Federal construction agency is planning a reservoir, particularly in the earlier phases of planning before design and cost options are foreclosed. Also, when the Federal Energy Regulatory Commission is considering licensing or relicensing a dam and reservoir project, or when the Bureau of Land Management or Forest Service is in the process of issuing a permit to construct a dam on Federal lands, this strategy would apply. The role of these agencies, however, is treated separately (see strategy entitled Federal License and Permit Stipulations). The Bureau of Indian Affairs manages reservoirs, but reservoirs under its management are constructed by the BR.

As provided by the Fish and Wildlife Coordination Act of 1958, the FWS and Washington Departments of Game and Fisheries would pursue this strategy. Although it would not be available directly to private parties or public interest organizations, they could play an important role in exerting pressure on the construction agency to accept the fish and wildlife agencies' recommendations.

To apply the strategy, the fish and game agencies must a conduct a timely investigation to formulate instream flow recommendations. Application of the strategy is contingent upon prompt notification by the construction agencies of the initiation of project planning. Each construction agency has promulgated procedures to provide for early notification and cooperation with the FWS and the Oregon Department of Fish and Wildlife.

A recent letter from the Commissioner of the BR to the Bureau's Regional Directors ordered them to notify the FWS of the initiation of project planning, and provide the FWS with the opportunity to participate in the formulation and evaluation of project plans and to present reports to the BR, including recommendations relating to fish and wildlife aspects of the project plan. The Corps issued procedures dated 15 August 1973 (to be updated in 1978) which require each District Engineer to provide the Federal and state fish and game agencies with advance information on the studies underway in his planning program; notify them of the initiation of the project investigation; continue liaison, including conferences, throughout the investigation; and obtain the recommendations of the fish and wildlife agencies. The SCS has the least stringent requirements for fish and wildlife agency input. Still, their procedures do encourage the Federal and state fish and game agencies to participate actively in project formulation and to incorporate needed measures in each project to the maximum extent feasible.

Once the Federal and state fish and game agencies have been notified of a project plan and brought into the planning process, they must initiate an investigation to develop timely recommendations. Although conducting investigations and formulating instream flow recommendations are usually time-consuming and expensive tasks, an insistence on timely performance could result in additional costs because of the lack of flexibility available to the field office administrator in allocating time of personnel. Also, earlier efforts can be wasted because preliminary construction plans are often changed or abandoned later on.

III. Illustration

Howard A. Hanson Dam and Reservoir is a CE Flood Control Project located in Eagle Gorge on the Green River in southern King County, Washington. The Green River rises in the Cascades; it becomes the Duwamish River 50 miles downstream, meanders another 12 miles through an industrial area of Seattle and empties into Puget Sound at Elliot Bay. The Green River is surrounded by rugged timbered terrain; the Snoqualamie National Forest is nearby. Since the reservoir is the source of water supply for the City of Tacoma, land use in the area is limited, and the project is closed to the public.

Twenty-six thousand acre-feet of the total storage capacity of 106,000 acre-feet are allocated to downstream summer low flow augmentation for fish and wildlife passage. The remainder of the storage is allocated to flood control. The project is operated so that the reservoir is empty from November 1 to February 1 (except for 10,000 acre feet retained during February), so that flood waters can be impounded. From March 1 to June 1 the reservoir is gradually allowed to fill with spring runoff. From June 1 to November 1 the reservoir is gradually emptied, providing flows for fishery enhancement and augmenting city of Tacoma water supply.

The project was authorized by Congress in the late fifties; construction was completed in 1961. The City of Tacoma diversion dam and headworks are located several miles downstream. This structure diverts 110 cfs for municipal and industrial use.

Studies done by the Washington Department of Fisheries in conjunction with United States Geological Survey show that post-project annual flows average 927 cfs; the highest recorded flow for 14 years following construction of the project was 10,400 cfs; the lowest was 124 cfs. No pre-project streamflow records are available.

Although the stream reach between the Howard Hanson Dam and the City of Tacoma Diversion Dam has not supported a fishery since 1909, when construction of the latter blocked all upstream migration of anadromous species, the stream reach below the Tacoma Dam is one of the most important contributions to both commercial and sports fishery in Puget Sound. Salmon runs prior to construction of Howard Hanson Dam were chiefly fall chinook and silver salmon. The Washington Department of Game reports that steelhead and sea-run cutthroat trout also use the spawning and rearing area below the Tacoma Dam. Post-project evaluations of the fishery are inconclusive because of a change in the Department of Fisheries' method of compiling statistics. Thus, it is not possible to say whether the predicted enhancement benefits to the downstream fishery have occurred. Biologists from the Department of Fisheries maintain, however, that the flows from Howard Hanson have had no adverse impact on the fishery; indeed, since the recommended flows are maintained in late summer, the Department feels that fish do benefit from the project at that time of year.

The formulation this strategy for this project required interaction between the FWS, the CE, and the Washington State Departments of Game and Fisheries. It also required dovetailing of plans with those of other projects. While Howard Hanson was still in the planning stage, in July 1948, the FWS prepared a preliminary evaluation report on fish and wildlife resources in relation to the proposed Green-Duwamish River Flood Control Project. Data for this report was derived from field investigations conducted by FWS between 1944 and 1948 and from studies compiled by the Washington Department of Fisheries. In this report the FWS recommended a minimum sustained flow of 110 cfs at Palmer, Washington, 6 miles below the Hanson project and downstream from the City of Tacoma Diversion Dam. This recommendation was twice the minimum flow at Palmer; it had originally been proposed by the CE, which promised to guarantee the flow.

Despite this guarantee, however, implementation of this minimum flow requirement might be difficult in a low-flow period. There is a potential conflict between the Washington Department of Fisheries and the City of Tacoma regarding water in Howard Hanson Reservoir. The Department of Fisheries has a right to all flood water stored in the reservoir for instream flows for fishery enhancement. The City of Tacoma has the right to all natural inflow to the impoundment. When there is no stored water, the City of Tacoma may divert 110 cfs from the natural inflow; any remaining flow is passed downstream for fishery enhancement. In such a situation fishery enhancement might receive less than 110 cfs. Conversely, if the natural flow falls below 110 cfs and there is stored water in the reservoir, the City of Tacoma is limited to an amount equivalent to the nautral inflow; 110 cfs of the stored water would have to be bypassed and sent downstream for fishery enhancement.

This situation occurred in October, 1974, a low water year when no water was stored in Howard Hanson Reservoir. Because of these unique circumstances the minimum flow at Palmer was not met. According to the Department of Fisheries, severe periodic violations also occurred in 1977 because of the drought.

No distinct methodology was used by the FWS to determine the minimum flow requirement at Howard Hanson Dam. Indeed, the fact that the CE was willing to double the existing minimum flow appears to have been a major consideration in the FWS recommendation. Apparently this minimum flow has generally been adhered to with the exceptions noted previously and the flow has been sufficient to maintain the fishery. The Department of Fisheries has recently taken steps to explore interaction between the CE operation of Howard Hanson Dam and the City of Tacoma's operation of its diversion dam. The Department has written to the CE to request discussions of future releases and reasons for failure to adhere to the recommended flows.

IV. Evaluation

As illustrated by the Howard Hanson Project, this strategy has apparently displayed significant past utility. Instream flow recommendations made by the FWS prior to project construction not only were accepted by the construction agency, but were proposed by it. Because the resource agencies were involved in the early planning stages, they were able to propose increased flows at stage when the construction agency was amenable to increasing fishery benefits.

A constraint on this strategy perhaps unique to this project is the conflict, in years when no flood water is available in storage, with the prior right to natural flows of the City of Tacoma. There is still a major problem of flow control, but the Department of Fisheries believes as a result of its field observations, that the project has benefited the fishery despite this constraint.

In judging the future effectiveness of the strategy, a number of factors must be considered. The strategy is applicable only when a Federal construction agency is building or modifying a project. Such construction will probably decrease in the future when compared to the spate of construction in the 20 years after World War II. Users of this strategy are limited to the FWS and the Departments of Game and Fisheries although private individuals or public interest groups can exert some influence with the construction agencies on behalf of the recommendations by the conservation agencies.

The effectiveness of this strategy depends, in large part, on the construction agencies' close adherence to their own adopted procedures concerning early notification of fish and wildlife agencies on project planning matters. According to FWS and State personnel, construction agencies have been following these procedures in Washington, especially in recent years. Even if the Federal and state fish and game agencies are informed of a project being planned and their inputs are invited, however, they must decide which projects to investigate in depth where a considerable expenditure of limited personnel and funds would be warranted. Also, timely investigations and recommendations may deprive state and Federal fish and game agencies of some flexibility in budgeting and scheduling. Finally, although a timely flow recommendation enjoys a better chance of acceptance, there is no assurance that such a recommendation will not be rejected on some other basis such as the reasonableness of the flow amounts requests.

Despite these constraints, this strategy does have some definite advantages. Offering flow recommendations is already part of an institutionalized process which has been ongoing for 30 years between the fish and wildlife agencies and the Federal construction agencies. This process has a firm legal basis and should be improved in the future.

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STATE-FEDERAL FLOW REQUESTS MADE SPECIFIC

I. Identification

Specifying instream flow requirements for a particular stream reach or tributary below a dam and reservoir, and monitoring actual instream flows there to ensure that downstream resource values are protected, involves detailed on-site investigations by the fish and game agency and subsequent stream gaging. Studies such as transect surveys must be performed at downstream locations selected so as to determine the instream flow needs in specific stream reaches below the dam site. Recommendations would then be offered to the construction agency specifying needed flow releases which, if accepted, would be incorporated into the reservoir's operating criteria. Gaging stations, located within the specific downstream reaches, would determine the sufficiency of the actual releases. The legal or administrative basis of this strategy is the interagency consultative process as provided for by the Fish and Wildlife Coordination Act.

II. Application

This strategy would be applied when the fishery, rookery, or other biotic resource within a reach or tributary remotely downstream from a dam and reservoir project is predicted to be, or is already, adversely affected by project flows. Often, a downstream fishery is threatened by low flows even though a required minimum flow is discharged upstream at the dam. Stream diversions and seepage from the stream channel often are responsible for the diminution of the original flow. Also, fishery flows required directly below the dam may be insufficient within a more remote reach or tributary downstream to satisfy localized fish and wildlife habitat requirements. In both cases, the specification of an instream flow requirement at a particular downstream site in addition to, or in place of a project flow release, and the installation of a streamflow gage will facilitate suitable flows in the remote stream reach or tributary. Furthermore, exact requirements supported by careful field investigations will be more persuasive in seeking any flow reservation.

Advocates of this strategy would be the Washington Departments of Game and Fisheries and the FWS. Public interest groups aware of localized fish and wildlife needs and stream conditions could also participate in applying this strategy. Implementation of the strategy requires that instream flow recommendations be provided to the construction or permit agency during the appropriate planning stage (see strategy entitled State-Federal Flow Requests Made Early). For existing projects, reauthorization or relicensing proceedings or administrative reassignment of reservoir storage could be instituted to reserve needed flows and provide gaging stations (see strategies entitled State-Federal Combined Storage and Flow Requests, Federal License and Permit Stipulations, and Federal Reauthorization of Projects).

The principal costs of applying this strategy result from detailed instream flow field studies performed by the involved fish and wildlife agencies at downstream sites. Installation and maintenance of streamflow gages in the designated stream reaches will account for additional costs.

III. Illustration

Gorge Dam is one dam of a three-dam complex operated for power production by the Seattle City Light Company. It is located two miles north of Newhalem on the Skagit River in Whatcom County, Washington. The principal stream reach affected by discharges from Gorge Dam is the 38 miles of the Skagit between Newhalem and Concrete, Washington. The dam is located in a constricted gorge and is surrounded by mountainous terrain.

The dam was constructed in the late 1950's and the reservoir completed in 1962. It is operated by the Seattle City Light Company under a Federal Energy Resource Commission license in conjunction with the Gorge Dam Power Plant located two miles downstream at Newhalem. Water from the reservoir is transported downstream to the powerhouse via a large conduit from which it passes through the generators and is discharged into the Skagit.

The mean annual flow for the 10 years preceding construction of Gorge Dam was 4,969 cfs. The high and low flows of record were 17,900 cfs and 702 cfs, respectively. After Gorge Dam was constructed, the two-mile reach between it and the power house was completely dewatered, except for dam spillover, because the water is piped to the power house. Water depth below the dam varies because of peaking operations at the power house. The stream bed downstream from the dam is characterized by numerous gravel bars which are exposed to a greater extent than in preproject years by the project operations. Downstream potholes and channels are likewise dewatered by project operations; the result is an increased occurrence of fry stranding. Mean daily flows for thirteen post-project years show a 5% decrease from pre-project flows. Post-project high and low flows are 31,600 cfs and 980 cfs, respectively. Discharge capability is 7,500 cfs. A minimum of 1,000 cfs discharge is stipulated by the FERC license. However, daily flows may fluctuate widely between these levels.

Because of the precipitous nature of the canyon there was no spawning above Gorge Dam power house even in years preceding construction of the present dam. Downstream of the power house, however, the Skagit supported runs of spring and fall chinook, pink salmon, coho salmon, and steelhead trout. Coho used spawning gravel in tributaries; steelhead usually spawned downstream. Reports of Department of Fisheries biologists indicate that variable flows resulting from power production stranded chinook fry and adversely affected the food chain downstream from the power plant.

Since the construction of Gorge Dam, these species continue to spawn in the reach below the power house and to use pre-project spawning grounds. Studies of the Washington Department of Fisheries show that peaking operations continue to have a deleterious effect on chinook fry.

These studies occurred in 1969-1970 and in 1973. The crucial study years were 1969 and 1970, when the studies were funded by the Department of Fisheries. These studies showed serious stranding and mortality problems for summer chinook and chum salmon, and resulted in a flow release schedule which recommended a minimum discharge into the Skagit at Marble mount of 2,800 cfs, with alternative recommended releases at Gorge Dam of 2,300 cfs from February 1 to April 15, 2,000 cfs from April 15 to May 1, and 1,700 cfs from May 1 to May 15.

These recommendations were observed by Seattle City Light in 1971 and 1972. However, in 1972 the power company requested the Department to reconsider the recommended schedule on the grounds that a recently revised operational policy would allow a reduction in the required releases. Hoping to develop support for this request, the power company funded a follow-up study performed by the Department of Fisheries and the University of Washington. The study employed a number of techniques to measure stranding, including direct observation, monitoring emergence of fry with an electro-shocker, and aerial photographs. Stream flows were also monitored, and sampling results were taken at 5 study sites over a two-day period.

The 1973 follow-up study showed that salmon fry losses were heavy and suggested revising the recommendations upward. In 1974, the Department of Fisheries renewed its recommendation of 2,800 cfs at Marblemont, averring that less than that following peaking discharges of a greater magnitude would drastically reduce survival of salmon fry.

A verbal agreement with the power company was reached wherein the 1973 recommendations were adopted. This agreement was violated in 1973, but adhered to in 1974 and 1975. In 1976, the power company adhered to the agreement after some pressure of public opinion was brought to bear. Since that time the gentleman's agreement has been generally complied with. Fluctuation of flows is still a problem, but the 2,800 cfs release helps minimize stranding losses.

It should be pointed out that this strategy could be employed again at Gorge Dam in conjunction with another strategy (see strategy entitled Federal License and Permit Stipulations) when the current FERC license for this project comes up for renewal.

IV. Evaluation

In many states, a major constraint on past use of this strategy has been the inadequacy of field studies. As the Gorge Dam stranding studies illustrates, however, the results of a specific and well-documented study are worth the time and resources devoted to its production. Although the costs associated with such detailed investigations are significant, they are justifiable where high-value fish and wildlife resources are at stake. A representative of the Department of Fisheries pointed out that the success of this strategy in the case of Gorge Dam occurred because the Department of Fisheries was able to quantify losses in economic terms, since the fishery involved was chiefly a commercial fishery. A possible constraint where species which are chiefly game are concerned is the difficulty of such economic quantification. Another possible constraint on a resource department is lack of engineering expertise with which to counter the arguments of power company and construction agency engineers. The Department of Fisheries has a staff engineer, which gives it greater flexibility of approach.

An added constraint in the future will be the costs of the installation and maintenance of streamflow gages which are necessary to fully implement this strategy. Conversations with the United States Geological Survey indicate that an assumption of gaging costs by a construction agency is determined on a case by case basis. In some instances, the construction agency and the fish and game agency will share these costs; otherwise, either one or the other will assume the total costs. The cost of installing a gage can range form $15,000 to $40,000; approximate annual operation and maintenance costs can be $4,000.

The future effectiveness of this strategy will be enhanced by improved study methodologies. The ability to document seasonal instream flow needs for a specific stream reach lends authenticity and credibility to the fish and wildlife agency's bargaining position, thus increasing the likelihood of a flow reservation. On occasion, the ability to quantify the instream contributions of tributary inflows and irrigation return flows could result in a downward adjustment of project releases, thereby preserving water for other beneficial uses.

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STATE-FEDERAL COMBINED STORAGE AND FLOW REQUESTS

I. Identification

When recommending flow releases from proposed or existing reservoir projects, the Fish and Wildlife Service and the Washington State Departments of Game and Fisheries should base their recommendations in part on information about storage capacity and projected sales of stored water. The strategy thus embraces simultaneous negotiations for downstream flows and surplus storage capacity in the reservoir sufficient to guarantee the flows. The legal basis of this strategy is the Fish and Wildlife Coordination Act which provides for consultation between state and Federal fish and game interests and the Federal construction agencies.

II. Application

This strategy is applicable in two situations: when a project is being planned by a Federal construction agency, and when storage space becomes available in either a planned or an existing reservoir. The parties to be involved in this strategy are primarily the FWS, the Washington Department of Game, and the Washington Department of Fisheries. They would apply this strategy in their dealings with Federal construction and operating agencies over planned and existing reservoir projects. Support for this strategy can be generated from local residents, conservancy districts, sportsmen, and environmental organizations.

Most operating reservoirs in the west contain either unobligated, unutilized or underutilized storage. "Unobligated storage" is reservoir storage which is not contractually obligated to water users although it is bound by legislative intent for particular purposes. "Unutilized storage" is contractually obligated for future or deferred use , whereas "underutilized storage" is currently not in use for a particular purpose although contractually obligated for that purpose. Knowledge of unutilized, unobligated and underutilized storage can lead to its interim or permanent allocation for minimum flow releases to satisfy instream flow needs of fish and wildlife. Even without producing an outright allocation, such knowledge can certainly strengthen the bargaining position of fish and wildlife interests seeking instream flow reservations.

Early in the project planning phase, the construction agencies should be requested to provide the FWS and State fish and game agencies with information regarding reservoir storage capacity and the projected sale or other commitment of storage. With this data, the fish and game agencies should be able to determine and negotiate for the amount of storage available to ensure minimum instream flows below the reservoir.

During project operation, some storage may become available--i.e., water which is unobligated, unutilized or underutilized. The FWS and the State fish and game agencies should have cultivated a cooperative arrangement with the Federal construction agencies, requiring notification when reservoir storage space becomes available. With this information, fish and game agencies may decide to recommend the allocation of reservoir storage to reinforce instream flow recommendations if the downstream fishery warrants this extra measure of protection.

The costs involved in implementing this strategy could vary dramatically, depending on the level of cooperation between the fish and game agencies and the Federal construction and operating agencies. If cooperative agreements under the Fish and Wildlife Coordination Act are successfully implemented (see strategy entitled State-Federal Interagency Consultation) then this strategy would not involve substantial costs. If, however, the FWS and the state fish and game agencies are not routinely furnished with information on planned reservoir capacities and anticipated sale of water storage, or information on available storage in existing reservoirs, then significant costs can be incurred in gathering this information.

III. Illustration

Wynoochee Reservoir, located on the Wynoochee River in Washington, was authorized by Congress in 1955 and constructed by the Corps of Engineers between 1969 and 1972. This project was originally intended to provide supplemental storage for industrial water needs in the City of Aberdeen and to provide storage for flood control. The project is presently operated primarily for flood control because the anticipated industrial water needs are as yet unrealized.

Prior to project construction, the FWS and the Washington Department of Fisheries were aware that storage of 64,000 acre-feet in Wynoochee Reservoir was obligated for the water supply of Aberdeen, Washington, but would not be fully utilized until the year 2000. Having this knowledge, these agencies prevailed upon the Corps of Engineers to release 200 cfs from Wynoochee Reservoir so as to maintain a flow of 120 cfs below Aberdeen Diversion Dam, located 43 miles downstream. This structure diverts flow for the City of Aberdeen's municipal and industrial needs. If and when Aberdeen's projected storage requirements actually materialize, the Corps will curtail releases from Wynoochee Reservoir as necessary.

The Wynoochee River is a natural habitat for coho and chinook salmon as well as steelhead, cutthroat, and Dolly Varden trout. Although reservoir releases of 200 cfs have proved sufficient for fish migration upstream, the multi-level outlet system of the Wynoochee Dam has hindered downstream migration. Therefore, the effectiveness of increased instream flows below Aberdeen Diversion Dam is difficult to ascertain.

IV. Evaluation

As illustrated by the example of the Wynoochee Reservoir, this strategy has begun to be implemented; but its utility in the past has not been widespread. The example specifically illustrates how reservoir storage capacity which becomes unobligated can be made available to provide releases for the downstream fishery with the cooperation of the construction agency, the local sponsor, and fish and wildlife interests. As of 1978, the Washington Department of Game has successfully bargained for the use of unobligated storage in several other reservoirs. The Department is expected to continue identifying other reservoirs suitable for the application of this strategy.

To a great extent, the future effectiveness of this strategy for new projects depends on successfully implementing other strategies,such as achieving interagency coordination under the Fish and Wildlife Coordination Act (see strategy entitled State-Federal Interagency Consultation) and recommending instream flows early in the planning process (see strategy entitled State-Federal Flow Requests Made Early). It is essential that fish and game agencies actively participate in planning reservoir projects and that they be informed about the availability of storage in already authorized and operating reservoirs.

The strategy's greatest potential exists when the local sponsoring entity and/or the construction agency sees the benefits involved in releasing available storage for fishery purposes and brings fishery agencies into the process of planning reservoir releases. In such instances, the costs of implementing this strategy are not particularly great; however, without cooperation among the agencies involved, the costs could be substantial. For example, major cost might be incurred by the fish and wildlife agencies in gathering information which could have been provided by the construction and operating agencies. On the other hand, fish and wildlife interests must justify the economics of allocating any available storage for fish and wildlife purposes.

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ENGINEERING ALTERNATIVES

COORDINATED MULTI-RESERVOIR OPERATIONS

I. Identification

The operations of a multi-reservoir system are regulated through an operations manual which specifies the flows to be released in keeping with the stated purposes of each project. The most common purposes for which multi-reservoir systems are operated are flood control, power production, and irrigation.

Coordinated operations of a multi-reservoir system to sustain or elevate minimum flows would require modification of the operations manual. To accomplish this, authorizing or licensing documents for component projects within the system must be modified to include the necessary releases. Modification of Federal projects may require reauthorization or relicensing proceedings (see strategies entitled Federal Reauthorization of Projects and Federal License and Permit Stipulations). At the minimum, an adjustment of flow releases would entail the preparation of a memorandum of agreement between the operators of the system and the fish and wildlife interests. The legal and administrative basis for this strategy is the agency and interagency regulations and procedures governing those agencies operating reservoir system. The Fish and Wildlife Coordination Act is the interagency mechanism.

II. Application

This strategy would be applied where a fishery or other aquatic resource below a dam within a multi-reservoir system could be rehabilitated or enhanced by coordinated releases from the system. Parties involved in the implementation of this strategy are likely to be the FWS, the Washington Department of Game, the Washington Department of Fisheries, and the agency or agencies operating the system. In many instances, the system operator will be a single entity, such as the Bureau of Reclamation operating an irrigation project. Where two or more entities such as the Bureau and the Corps would be responsible for project operations, regulation of the system is often mediated using a memorandum of agreement among the agencies involved. Attempts to secure minimum instream flows by balancing system operations would call for drafting a revised memorandum of agreement. In larger systems, where private or municipal power companies may be among the operating agencies, coordination may be even more complex and difficult to achieve.

For those river systems in Washington which form a part of the Columbia Basin, application of this strategy may involve the Reservoir Control Center operated by the Corps of Engineers North Pacific Division Office in Portland. This center plan and directs the regulation of reservoirs in the Columbia Basin for the authorized purposes of the projects, which include navigation, irrigation, power generation, flood control, fish and wildlife enhancement, and municipal and industrial water supply.

The Control Center's purpose is to maintain balance among the multiple purposes of the various dams. A request from an agency or even an individual, to the Center for an action to mitigate fish and wildlife damage at a given project will be considered. After the need has been verified by a Project Engineer and if the need does not jeopardize the project's authorized purposes, the Corp will comply with the request.

Upon determining stream flows to be insufficient to sustain the fishery below a dam within the reservoir system, the interested fish and wildlife agency must examine the operating characteristics of the system, especially its flow regimes and its storage capacities (see strategy entitled State-Federal Combined Storage and Flow Requests). Field studies would be performed to establish the flow needs for the affected stream reach. Given the system characteristics and the instream flow needs, the fish and wildlife interests could propose to alter the operations manual and memorandum of agreement to ensure the recommended flows.

The cost of conducting system-wide flow studies will be the principal cost incurred during the implementation of the strategy. Additional costs will result from presenting a convincing case to the operating agency toward revising the system operations manual and in reauthorization or relicensing proceedings if these become necessary. The process may prove to be a long one; because of the many agencies involved in dam operations in some of the larger basins, bargaining for fisheries may have to be done dam by dam.

III. Illustration

The coordinated operations of two City of Tacoma power dams on the Cowlitz River illustrates the use of this strategy in Washington. The Cowlitz River is a principal tributary of the lower Columbia River; it rises in the Cascade Mountain range and flows in a west-southwesterly direction, draining into the Columbia not far from its mouth. Mossyrock Dam, located near the town of Mossyrock, forms the reservoir, called Davisson Lake; Mayfield Dam, about 10 miles downstream, controls the downstream flow. The Cowlitz River is a major producer of salmon and steelhead; excessive releases from the power dams at certain times of the year and daily fluctuating releases are detrimental to spawning habitat and result in fish standing and mortality. There is, however,some flexibility in dam operation; water can at times be stored for later release instead of being spilled.

In 1977, the Washington Departments of Fisheries and Game reached a precedent-setting agreement with the power company regarding regulation of releases from the dams. This agreement was reduced to writing, and although its language allows the power company some leeway, it is an improvement over the unwritten "gentlemen's agreement." Specifically the agreement includes a requirement for a maximum release range of from 2000 to 400 cfs during the fall chinook spawning season. Department of Fisheries studies had shown that this range was the optimum range for spawning purposes. The releases are monitored by means of a USGS gage 1 mile downstream from the lower dam; the Department of Fisheries receives bi-monthly reports of streamflow measurements from this gage. The agreement has been complied with to date, and the Department of Fisheries feels that the strategy has been successful.

Negotiations for this agreement coincided with the power company's request to the FERC to install a forth powerhouse at the project. The Departments of Game and Fisheries intervened in the application process in order to study potential effects of such an addition on the fishery. Both Departments were involved in the protest, since Fisheries deals with commercial, food fisheries, and salmon would be affected while Game deals with game fisheries, and steelhead would also be affected. The Departments of Fisheries and Game ultimately determined that a fourth powerhouse would not harm the fishery; however, they were able to use the intervention to help in their negotiations with the power company for coordinated releases designed with the needs of the fishery in mind. The net result was more power for the power company and some enhancement of the fishery habitat for the Departments of Game and Fisheries. Department of Fisheries sources feel that the leverage of the intervention in the power company's application was crucial to the achievement of the agreement, and that though the company probably has similar flexibility of operations at other dams, it will be reluctant to employ it unless similar pressure is brought to bear.

IV. Evaluation

In general, this strategy has produced successful results in Washington in the past. Successful application of the strategy depends to a large extent on what the individual project circumstances are. If the operating agency can be made to see the value of the fish and wildlife benefits, they are more likely to accept the recommendation.

Where only one operating agency is involved in the operation of a series of dams, such as the Cowlitz River dams, the major constraint on the applicability of this strategy is how much water is available for allocation to the various uses. The operating agency must decide what is necessary for its authorized uses, and these needs vary from time to time. Other constraints are the amount of flexibility in dam operation available to the operating agency and the degree of leverage available to the resource agencies in getting the operating agency to modify its operations. Where the resource agency has something to trade,as was true in the Cowlitz River agreement, the operating agency is more likely to be cooperative.

In the case of larger basins, where many operating and managing agencies are involved, such as the Columbia Basin System, coordination becomes extremely complex, both because of the magnitude of the system and because of the number of parties and conflicting interests involved. Nevertheless, successful coordination is possible if the need is great enough. A cooperative attitude on the part of one significant operating agency, such as the North Pacific Division of the Corps of Engineers, and the existence of a center for coordination, such as its Reservoir Control Center facilitate cooperation from other operating agencies. Also essential in achieving system-wide cooperation in a complex basin such as the Columbia is a sense of public recognition of the value of the threatened resource. In the 1977 low-flow crisis on the Columbia, for example, public pressure,including the support of the governors of the four Columbia Basin states - Oregon, Washington, Idaho, and Montana - was influential in getting both the Corps and the power companies to schedule releases at each dam in the system to enable the downstream migration of fingerling salmonids.

Future utilization of this strategy will increase as the interest in fish and wildlife habitats increases compared with project purposes such as flood control, irrigation, and power production. Officials in the Washington State Department of Fisheries are optimistic about the future effectiveness of this strategy because the achievement of a written agreement in the Cowlitz case may set a precedent to be followed elsewhere. The cooperative attitude of the Federal construction agency personnel is also encouraging.

However, there are a number of cost constraints which will continue to limit the use of this strategy. The fish and game agencies will incur increasing costs for flow studies which increase in complexity and sophistication as entire multi-reservoir systems are analyzed in greater depth. Hydrologic data engineering expertise requirements will demand that fish and wildlife interests acquire the analytical skills of the construction agencies in addition to their established biological expertise. These contraints, though, do not preclude the use of this strategy, expecially in view of the receptivity of agencies such as the Corps to fish and wildlife needs.

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RESERVOIR SEDIMENT STORAGE RELEASES

I. Identification

Releases of yield from sediment reserve storage for augmenting instream flows involve storage space reassignment by the construction or administering agency. Sediment reserve storage space is the portion of reservoir capacity assigned to sedimentation during the economic life of the project. After a project is constructed, the total amount of storage capacity assigned to a sediment reserve will not be needed for many years. This storage, then, can be made available on a long-term interim basis for fish and wildlife protection and other beneficial uses. Such a reassignment is an adminstrative decision and does not necessitate Congressional reauthorization of the project. The legal and administrative basis of this strategy is the construction or operating agency's statutory authority and administrative regulations authorizing discretionary modifications of operating projects.

II. Application

This strategy will be discussed only as it applies to existing reservoirs. Applying it to proposed projects involves interagency coordination in the planning process (see strategies entitled State-Federal Flow Requests Made Early, State-Federal Combined Storage and Flow Requests, and State-Federal Interagency Consultations). The strategy may be formulated when a proposed or existing reservoir contains unused sediment reserve storage in the active reservoir space lying above the elevation of the lowest dam outlet. Such storage is normally preserved or else drawn down for beneficial uses such as recreation, irrigation or water supply in compliance with operating restrictions. Either the Washington Departments of Fisheries and Game, Fish and Wildlife Service, or a conservation group could instigate this strategy if it determines that an available yield from the sediment reserve can rehabilitate or improve the fish and wildlife resources downstream from the existing reservoir. Ultimately, the concerned party must convince the construction or administering agency, such as the Bureau of Reclamation or the Corps of Engineers, to reassign a portion of the unused sediment reserve storage space to fish and wildlife purposes.

Implementation of this strategy involves two basic decision points. After reaching a favorable preliminary determination, the concerned party must decide to solicit the construction or administering agency for action to modify project operation and release some yield from the sediment reserve. Then the agency must decide if the desired modification is feasible and agreeable. Because of the controversy that is often associated with preserving instream flows, the construction or administering agency might seek formal Congressional approval.

The costs of this strategy to fish and wildlife interests are dependent on the detail and availability of information concerning the sediment reserve storage and the fish and wildlife resources downstream from the reservoir. The concerned party will need to know the amount, depletion rate, and current interim uses of the sediment reserve. In addition, the probable effects that increased instream flows, due to a certain yield of the reserve, would have on the fish and wildlife resources would have to be ascertained.

III. Illustration

Although no actual illustration could be identified in Washington, an example of a reservoir presently suitable to this strategy in Colorado can be discussed. Completed in 1963, the Bureau of Reclamation's Paonia Project is located on Muddy Creek in west-central Colorado. The stream below Paonia dam supports trout habitat which would improve significantly if added reservoir releases of relatively clear water could be made.

Because of a projected severe sedimentation problem, a substantial portion (44%) of the active storage capacity of Paonia Reservoir was reserved for sediment accumulation. By the end of 50 and 100 years of reservoir operation, the deposition of sediment is estimated to reduce the active reservoir capacity from 18,150 acre-feet to 14,650 and 10,150 acre-feet, respectively. The Upper Colorado Regional Office of the Bureau has stated verbally that the 8,000 acre-feet of sediment reserve storage might be available for interim use.

In fact, the Bureau, in a project planning report, stated that surplus sediment reserve storage space in Paonia Reservoir would be available for flood control and incidental releases to maintain fish life in the stream below the dam. However, it was also stated that the North Fork Conservancy District could use the 8,000 acre-feet of reserved capacity for irrigation or other beneficial uses until it is required by the United States for one or more of the specified purposes. The BR's Upper Colorado Office confirmed that the conservancy district is utilizing this storage.

Neither the FWS nor Colorado Division of Wildlife has attempted to secure increased releases from Paonia Reservoir. However, the proposed Grand Mesa Project, which would require the construction of Electric Mountain Reservoir immediately upstream from Paonia Reservoir, will probably enable both organizations to review the Paonia storage situation. Furthermore, Electric Mountain Reservoir should diminish the sediment deposited in Paonia Reservoir, thus freeing some storage capacity for long-term obligations.

IV. Evaluation

Although this strategy apparently has not been implemented in the past, it does appear to have broad application because most reservoirs, especially the newer ones, contain substantial sediment reserve storage capacity in the active storage space. The strategy's future effectiveness is primarily limited by the ability of Federal, state or private fishery interests to:

- Determine that the available interim yield from sediment reserve storage can significantly improve the associated fish and wildlife resources

- Convince the construction or administering agency to reassign and release the surplus water storage for fish and wildlife benefits.

The Corps and Bureau frequently apply the surplus sediment reserve on an *ad hoc* basis to purposes such as irrigation and municipal-industrial water supply. The user for these purposes is not charged for this water. Thus, it is likely that users of this supplemental water would lobby against its reassignment to fish and wildlife protection. Both the FWS and Departments of Fisheries and Game indicate that this strategy may be of potential utility and its application warrants further investigation. Probably the yield from sediment reserve storage space would be reassigned to fish and wildlife purposes only where it is currently unutilized and would significantly improve the downstream resources.

Attempting to ensure releases of sediment reserves requires an examination of existing project records and operations. Because FWS and state fish and game agencies' field offices direct their efforts towards proposed projects, implementing this strategy would involve an expenditure of personnel time normally not provided for from funds transferred by construction agencies. This is a major constraint upon the future effectiveness of this strategy. Probably the best opportunity to implement the strategy would arise when an existing project is modified or a planned project, such as the Grand Mesa Project, would have an impact upon existing reservoir operations.

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STREAM CHANNELS TO CONVEY STORED WATER

I. Identification

In operating dam and reservoir projects to convey stored water to downstream users, water is either released into the stream and diverted at a point downstream or conveyed directly from the reservoir via a canal or conduit. This strategy is an attempt to have proposed reservoir projects designed without direct conveyance systems at the reservoir so that water can be released into the stream to benefit fish and wildlife, then diverted as far downstream as may be feasible. This strategy can be effectuated through the consultative process stipulated by the Fish and Wildlife Coordination Act (FWCA).

II. Application

As provided by the Fish and Wildlife Coordination Act, the Fish and Wildlife Service and the Washington Departments of Fisheries and Game conduct investigations of sites proposed for reservoir projects, then formulate and present recommendations to the construction agencies concerning fish and wildlife preservation or enhancement. If, as part of their investigations, the FWS and state agencies determine that a reservoir conveyance system may damage the downstream fishery or other biotic resources, they might recommend that such a system be modified. They could draw support from local interest groups and users of the resource to give greater force to such a recommendation.

In conducting their project investigations, the FWS and Washington Departments of Fisheries and Game are provided with information by the sponsoring agencies. Any information regarding proposed conveyance systems should be sought at the outset because a recommendation to modify or not build a conveyance system must be made early in the planning process. Because detailed engineering and planning are involved, construction agencies and permit applicants would resist a change of plans after spending time and money to develop them. Once the construction begins, a sponsoring agency almost assuredly would not stop construction solely on the recommendation of fish and wildlife interests.

III. Illustration

Although this strategy has not been applied in Washington, a site in Wyoming presently under consideration for implementation of this strategy serves to demonstrate the strategy's potential utility. The proposed Middle Fork Reservoir on the Middle Fork Powder River serves as an illustration of this strategy's potential. In 1974, the Powder River Reservoir Corporation filed for a BLM right-of-way permit to flood certain Federally owned lands for the construction of Middle Fork Reservoir. The proposed reservoir will supply water for coal-related industrial development and, to a lesser extent, irrigation. As proposed, water would be conveyed from the reservoir through a canal system to meet these demands.

In 1976 at the request of the BLM, the FWS and Wyoming Game and Fish Department responded to the proposal. After joint field surveys were conducted, a report was submitted by the FWS to the BLM on March 5, 1976. The FWS recommended a minimum instantaneous release of 35 to 40 cfs during the non-irrigation season to develop a good-quality tailwater and downstream fishery. The recommended flow would approximate the historical average winter flow. Without these releases the existing fishery would be seriously curtailed.

The FWS recommended that the only practical way to realize a winter release of this magnitude without destroying the industrial water purpose of the proposed project would be to convey the industrial water down the existing Middle Fork channel to a downstream point of diversion 4.7 miles below the proposed dam. The FWS had indicated that the proposed modification would not result in additional construction.

In late 1977 the planned construction of Middle Fork Reservoir was delayed until the Department of the Interior's solicitor could determine if a right-of-way permit could be granted by the BLM, because the Powder River Reservoir Corporation had not adequately specified the use of the reservoir storage. If a permit was to be granted, the Secretary of the Interior might require that the permittee provide for storage releases sufficient to meet instream flow needs below the dam. It was expected that a decision would be made on the right-of-way permit sometime in February 1978.

IV. Evaluation

Although this strategy has not yet been applied in Washington it does offer potential for protection of fisheries directly downstream from reservoirs. Although, the FWS and Departments of Fisheries and Game are unaware of specific sites suitable for the application of this strategy, these agencies indicate that this strategy would offer the greatest potential utility in the drier eastern portion of the State. Several severe constraints, though, must be weighed in judging future effectiveness. Reservoir conveyance systems usually occur as a function of project purpose or engineering necessity. Single-purpose power and municipal supply projects most frequently divert water directly from the reservoir. Most offstream appropriators seek gravity flow delivery by conduit or canal to minimize pumping costs; sound engineering judgment and ordinary cost saving considerations may demand direct conveyance from the reservoir. Since conveyance structures are costly, construction agencies and permit applicants normally would maximize the use of the stream channel, subject to trade-off cost factors such as high energy use to deliver water by pumping instead of gravity. As evidenced in the Middle Fork Reservoir case, the burden will be on the FWS and the Departments of Fisheries and Game to justify their recommendation from a cost and engineering standpoint, taking the value of the threatened resource into account in a cost/benefit analysis.

Investigating a proposed project and formulating recommendations, pursuant to the FWCA, usually required substantial time and money. To implement this particular strategy may incur significant additional costs in performing detailed studies to defend a recommendation to modify the reservoir conveyance system. In the case of the Middle Fork Reservoir, the required engineering expertise and additional study cost was atypically low because the cost trade-offs were easily derived.

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